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4E. Individuals with Opioid Misuse

The components of this abatement category are subsumed in other abatement interventions that I propose including Health Professional Education, Safe Storage and Drug Disposal, and interventions targeting Adolescents and Young Adults.

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Trumbull County Opioid Epidemic Abatement Estimates
Last updated: April 14, 2021

This worksheet contains redress models and their population inputs
for opioid abatement, 2021-2035

Abatement Categories

Category 1: Prevention - Reducing Opioid Oversupply and Improving Safe Opioid Use

- 1A. Health Professional Education
- 1B. Patient and Public Education
- 1C. Safe Storage and Drug Disposal
- 1D. Community Prevention and Resiliency
- 1E. Harm Reduction
- 1F. Surveillance, Evaluation, and Leadership

Category 2: Treatment - Supporting Individuals Affected by the Epidemic

- 2A. Connecting Individuals to Care
- 2B. Treatment for Opioid Use Disorder
- 2C. Managing Complications Attributable to the Epidemic
- 2D. Workforce Expansion and Resiliency
- 2E. Distributing Naloxone and Providing Training

Category 3: Recovery - Enhancing Public Safety and Reintegration

- 3A. Public Safety
- 3B. Criminal Justice System
- 3C. Vocational Training, Education, and Job Placement
- 3D. Mental Health Counseling and Grief Support

Category 4: Addressing Needs of Special Populations

- 4A. Pregnant Women, New Mothers, and Infants
- 4B. Adolescents and Young Adults
- 4C. Families and Children
- 4D. Homeless and Housing Insecure Individuals
- 4E. Individuals with Opioid Misuse



I provide population estimates for different abatement categories. The population that is relevant for each category over time is estimated using one of five approaches (Table 1):

CONSTANT – The population of some categories is held constant. In other words, I assume the number of Bridge programs for emergency departments (EDs) should be held constant over the 15 years of the abatement plan.

WORKFORCE – For some categories, I estimate the change in key populations using data from the Ohio Department of Job and Family Services for the projected percent change in employment for various occupations. I convert 2018 to 2028 10-year employment outlook to annual projected changes to estimate growth in employment from 2021 to 2035. For example, the 10-year employment outlook for physician assistants is 27.4%, which I convert to an annual estimate of 2.5% and I apply it to the number of physician assistants in 2019 in Trumbull County to estimate the number of physician assistants from 2021 to 2035.

GENERAL POPULATION – For some categories, I estimate the number of relevant individuals using population projections from the U.S. Census Bureau. For example, the projected number of residents in Trumbull County through 2035 is estimated using these data.

TARGET POPULATION – For some categories, I vary the coverage and/or the intensity of specific abatement programs over time based on the short- and long-term needs and to allow for realistic scaling. For example, mass media campaigns should reach 85% of the target population in year 1 and decrease over time to reach 75% of the target population in year 15. Additionally, the proportion of individuals on medications for addiction treatment (MAT) should increase over time from 30% in year 1 to 60% in year 15 to better comply with evidence-based treatment guidelines.

INTERVENTION POPULATION – For some categories, I apply a trend ratio that represents the expected reduction in relevant populations based on the implementation of the abatement plan I propose. Several models,¹⁻⁵ including ours,⁶ project the expected impact of different combinations of interventions such as: (1) reducing opioid prescribing; (2) cutting diversion; (3) increasing addiction treatment; (4) reducing treatment relapse; and (5) increasing naloxone distribution. Depending upon the specifics, these models estimate a reduction of approximately 10%-40% in opioid-related morbidity and mortality, including the number of opioid overdose deaths and the number of individuals with opioid use disorder (OUD), over a period of 5-10 years. Given that I propose more comprehensive, coordinated and sustained interventions, I project that they will reduce the number of individuals with OUD and other relevant populations by 50% over 15 years and I scale select populations accordingly (Table 2). For example, I apply the intervention population trend ratio to the number of individuals with OUD in Trumbull County to reflect a decrease in the size of this population over time as the abatement plan is implemented.

1. PERAL, Humphreys K, Brando M. Modeling the Effect of Health Policy Responses to the US Opioid Epidemic. *American Journal of Public Health*. 2018;108:1394-400.

2. Winkler W, Nelson A, Gekant P. Dynamic Model of Nonmedical Opioid Use, Injection and Patient Policy Interventions. *The American Journal of Drug and Alcohol Abuse*. 2019;45:509-18.

3. Owen D, Lintche H, Wesson D, Liao M, Hoffman R, Hernandez S, Walensky S, Freedberg CA, Nappert S, Knutson AL, Pridgen J. The Impact of Prescription Opioid Misuse and Projected Overdose Deaths in the United States. *JAMA Network Open*. 2019;2:e181628.

4. Henner J, Winkler W. A Dynamic Model of the Opioid Epidemic With Implications for Policy. *The American Journal of Drug and Alcohol Abuse*. 2020;7:1-14.

5. Isakovich J, Henshaw O, Liu S, Chaturvedi A, Patel RA, Dawdy DW, Alexander GC. Modeling Mitigation Strategies to Reduce Opioid-Related Mortality and Morbidity in the US. *JAMA Network Open*. 2020;3:e2023677.

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4D. Homeless and Housing Insecure Individuals

	Year														
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Permanent supportive housing</u>															
[1] Total number of homeless individuals with OUD	17	16	16	15	14	14	13	12	12	11	11	10	10	9	9
[2] Permanent supportive housing for homeless individuals with OUD	17	16	16	15	14	14	13	12	12	11	11	10	10	9	9
<u>2. Recovery housing</u>															
The components of this abatement category are subsumed in 2B (1. ASAM levels of care for OUD treatment), 3B (3. Transitional housing for newly released), and 4A (3. Prenatal and postpartum housing services)															
[3] Intervention Population Trend Ratio	0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50

OUD Opioid Use Disorder; ASAM American Society of Addiction Medicine

Notes	Input	Source(s)
[1] Number of homeless individuals with OUD * [3]	18	Number of homeless individuals * Proportion of homeless population with OUD.
Number of homeless individuals in Trumbull County	100	2019 data. Ohio Balance of State CoC. 2019 Point in Time Count (Individuals). https://public.tableau.com/profile/ohiooscoc#!/vizhome/2019PointinTimeCountOhioBalanceofStateCoC/Individuals .
Proportion of homeless individuals with OUD	17.9%	2012 data. Iheanacho T, Stefanovics E, Rosenheck R. Opioid Use Disorder and Homelessness in the Veterans Health Administration: The Challenge of Multimorbidity. <i>Journal of Opioid Management</i> . 2018;14:171-82.
[2] = [1]		All homeless individuals with OUD should receive permanent supportive housing. Expert opinion.
[3] Retrieved from "Abatement Scaling" tab		
Costs Description		
[2] Permanent supportive housing cost per person		

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[6] Number of children in foster care due to parental opioid use * [15]	76	Number of children in foster care * Proportion of children in foster care due to parental opioid use.
Number of children in foster care	273	2016 and 2018 data. Average number of children placed in out of home care in Trumbull County in 2016 and 2018. Public Children Services Association of Ohio (PCSAO). Trumbull County Profile, 2019 PCSAO Factbook, 14th edition. https://www.pcsao.org/pdf/factbook/2019/Trumbull.pdf .
Proportion of children in foster care due to parental opioid use	28.0%	Informed by Public Children Services Association of Ohio. PCSAO Factbook 13th Edition 2017. http://www.pcsao.org/pdf/factbook/2017/Front.pdf .
[7] = [6] * 40.0%	40.0%	More than 40.0% of children in foster care are estimated to have an emotional, behavioral, or mental health challenge. Expert opinion.
[8] = [6] / 2.3	2.3	Median household size in Trumbull County. Retrieved from tab "3D. Mental Health Counseling", input [5] notes.
[9] = [8] * 47.9%	47.9%	Proportion of children who received a child welfare investigation with emotional, behavioral, or mental health issue. Expert opinion.
[10] = [8] * 47.9%	47.9%	Proportion of children who received a child welfare investigation with emotional, behavioral, or mental health issue. Expert opinion.
[11] Number of children adopted due to parental opioid use * [15]	7	Number of children adopted * Proportion of children in adopted due to parental opioid use.
Number of children adopted	26	Average number of children adopted in Trumbull County in 2016 and 2018. Public Children Services Association of Ohio (PCSAO). Trumbull County Profile, 2019 PCSAO Factbook, 14th edition. https://www.pcsao.org/pdf/factbook/2019/Trumbull.pdf .
Proportion of children adopted due to parental opioid use	28.0%	Same as proportion of children in foster care due to parental opioid use.
[12] = [11] * 54.0%	54.0%	Approximately half (54.0%) of children adopted from foster care have special needs, including behavioral and mental health issues. Expert opinion.
[13] = [11] / 2.3	2.3	Median household size in Trumbull County. Retrieved from tab "3D. Mental Health Counseling", input [5] notes.
[14] = [13] * 47.9%	47.9%	Proportion of children who received a child welfare investigation with emotional, behavioral, or mental health issue. Expert opinion.
[15] Retrieved from "Abatement Scaling" tab		
Costs Description		
[2] Socio-emotional support cost per child		
[4] Intensive parent-child interventions cost per family		
[5] Peer/family mentoring services cost per family		
[6] Foster care cost per child		
[7] Socio-emotional support cost per child		
[9] Intensive parent-child interventions cost per family		
[10] Family treatment court cost per family		
[11] Adoption cost per child		
[12] Socio-emotional support cost per child		
[14] Intensive parent-child interventions cost per family		

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	B	C	D	E	F	G	H	I	J
	Table 1. List of Trend Ratios Applied to Populations by Abatement Category								
	Note: populations not listed in this table are held constant.								
	Abatement Category	Population	Relevant Trend Ratio						
1A. Health Professional Education		Total number of prescribers eligible to receive academic detailing in Trumbull County	Workforce						
		Proportion of prescribers to receive academic detailing	Target Population						
		Total number of prescribers eligible for continuing professional education	Workforce						
1B. Patient and Public Education		Total Trumbull County population aged 12 years and older	General Population						
		Proportion of Trumbull County population to be targeted by media campaigns	Target Population						
1C. Safe Storage and Drug Disposal		Total Trumbull County population	General Population						
		Proportion of medications collected that are opioids	Target Population						
1D. Community Prevention and Resiliency		Total Trumbull County population aged 12 years and older	General Population						
		Total number of opioid injection drug users	Intervention Population						
1E. Harm Reduction		Proportion of opioid injection drug users reached by SSPs	Target Population						
		Proportion of opioid injection drug users to receive fentanyl testing strips	Target Population						
2A. Connecting Individuals to Care		Total number of opioid-related ED visits and hospitalizations	Intervention Population						
		Total number of individuals with OUD	Intervention Population						
		Proportion of individuals with OUD to receive treatment*	Target Population						
2B. Treatment for Opioid Use Disorder		Proportion of individuals with OUD in treatment to receive MAT	Target Population						
		Proportion of individuals to receive ACT	Target Population						
		Total number of opioid injection drug users	Intervention Population						
		Proportion of opioid injection drug users to be screened	Target Population						
		Total number of new HIV cases with opioid-related IVDU	Intervention Population						
		Total number of new HIV cases with opioid-related IVDU	Intervention Population						
		Total number of new endocarditis cases with opioid-related IVDU	Intervention Population						
		Total number of prescribers in Trumbull County	Workforce						
		Total number of opioid-related ED visits and hospitalizations	Intervention Population						
2D. Workforce Expansion and Resiliency		Total number of first responders eligible to receive compassion fatigue interventions	Workforce						
		Proportion of first responders to receive compassion fatigue interventions	Target Population						
		Proportion of prescribers to receive compassion fatigue interventions	Target Population						
		Total Trumbull County population aged 18 years and older	General Population						
		Total number of first responders in Trumbull County eligible to receive training	Workforce						
		Number of opioid-related ED visits and hospitalizations in Trumbull County	Intervention Population						
2E. Distributing Naloxone and Providing Training		Total number of OUD patients eligible for Narcan® distribution	Intervention Population						
		Proportion of OUD patients to receive Narcan®	Target Population						
		Total Trumbull County population to establish naloxone public lock boxes	General Population						
3A. Public Safety		Total number of law enforcement officers to receive stigma reduction training	Workforce						
3B. Criminal Justice System		Total number of individuals released from jail/prison with OUD	Intervention Population						
		Total Trumbull County population aged 12 years and older	General Population						
3D. Mental Health Counseling and Grief Support		Total number of opioid-related deaths	Intervention Population						
		Total number of counselors needed to deliver mental health and grief support	Intervention Population						
		Total number of pregnant women eligible to receive universal prenatal screening	General Population						
4A. Pregnant Women, New Mothers, and Infants		Total number of pregnant women with OUD	Intervention Population						
		Total number of infants diagnosed with NAS to receive medical care	Intervention Population						
		Total number of adolescents eligible to receive prevention programs	General Population						
4B. Adolescents and Young Adults		Proportion of adolescents to receive prevention programs	Target Population						
		Total number of adolescents to receive STIR	Intervention Population						
		Total number of school social workers needed	Intervention Population						
		Total number of children living with parents with OUD	Intervention Population						
4C. Families and Children		Total number of children in foster care due to parental opioid use	Intervention Population						
		Total number of children adopted due to parental opioid use	Intervention Population						
4D. Homeless and Housing Insecure Individuals		Total number of homeless individuals with OUD	Intervention Population						
ED Emergency Department; MAT Medications for Addiction Treatment; OUD Opioid Use Disorder; ACT Assertive Community Treatment; SSPs Syringe Service Programs; HCV Hepatitis C Virus; VDU Intravenous Drug Use; HIV Human Immunodeficiency Virus; NAS Neonatal Abstinence Syndrome; STIR Screening; Treatment Initiation and Referral									

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Table 2. Intervention Population Trend Ratio by Year	
Year	Intervention Population Trend Ratio
2020 (baseline)	1.00
2021	0.96
2022	0.91
2023	0.87
2024	0.83
2025	0.79
2026	0.76
2027	0.73
2028	0.69
2029	0.66
2030	0.63
2031	0.60
2032	0.58
2033	0.55
2034	0.53
2035	0.50

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4C. Families and Children

	Year														
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Support for children living with parents with OUD</u>															
[1] Total number of children living with parents with OUD	1,361	1,300	1,242	1,186	1,133	1,082	1,033	987	943	900	860	821	784	749	716
[2] Number of children eligible to receive socio-emotional support	652	623	595	568	543	518	495	473	451	431	412	393	376	359	343
[3] Number of families with a parent with OUD	592	565	540	516	492	470	449	429	410	391	374	357	341	326	311
[4] Number of families eligible to receive intensive parent-child interventions	283	271	259	247	236	225	215	206	196	187	179	171	163	156	149
[5] Number of families eligible to receive peer/family mentoring services	283	271	259	247	236	225	215	206	196	187	179	171	163	156	149
<u>2. Support for children in foster care</u>															
[6] Total number of children in foster care due to parental opioid use	73	70	67	64	61	58	55	53	51	48	46	44	42	40	38
[7] Number of children in foster care eligible to receive socio-emotional support	29	28	27	25	24	23	22	21	20	19	18	18	17	16	15
[8] Number of foster families of children in foster care due to parental opioid use	32	30	29	28	26	25	24	23	22	21	20	19	18	17	17
[9] Number of foster families eligible to receive intensive parent-child interventions	15	15	14	13	13	12	12	11	11	10	10	9	9	8	8
[10] Number of foster families eligible to participate in family treatment courts	15	15	14	13	13	12	12	11	11	10	10	9	9	8	8
<u>3. Support for adopted children and families</u>															
[11] Total number of children adopted due to parental opioid use	7	7	6	6	6	6	5	5	5	5	4	4	4	4	4
[12] Number of children adopted eligible to receive socio-emotional support	4	4	3	3	3	3	3	3	3	2	2	2	2	2	2
[13] Number of adoptive families of children adopted due to parental opioid use	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2
[14] Number of adoptive families eligible to receive intensive parent-child interventions	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
[15] Intervention Population Trend Ratio	0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50
OUD Opioid Use Disorder															
Notes	Input		Source(s)												
[1] Number of children living with parents with OUD * [15]	1,425		2017 data. An estimated 57,500 children were residing in a household with a parent with OUD in Ohio in 2017. This estimate was multiplied by 2.5%, which is the 2016-2019 average proportion of overdose deaths in Trumbull County (96 deaths) out of the state of Ohio's total (3,730 deaths; CDC WONDER data). Brundage SC, Levine C. The Ripple Effect: The Impact of the Opioid Epidemic on Children and Families. United Hospital Fund and Milbank Memorial Fund. Published 2019. https://uhfmyc.org/media/filer_public/6e/80/6e80760f-d579-46a3-998d-1aa816ab06f6/uhf_ripple_effect_national_and_state_estimates_chartbook.pdf .												
[2] = [1] * 47.9%	47.9%		Proportion of children who received a child welfare investigation with emotional, behavioral, or mental health issue. Expert opinion.												
[3] = [1] / 2.3	2.3		Median household size in Trumbull County. Retrieved from tab "3D. Mental Health Counseling", input [5] notes.												
[4] = [3] * 47.9%	47.9%		Proportion of children who received a child welfare investigation with emotional, behavioral, or mental health issue. Expert opinion.												
[5] = [3] * 47.9%	47.9%		Proportion of children who received a child welfare investigation with emotional, behavioral, or mental health issue. Expert opinion.												

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Costs Description		
[3] Prevention intervention cost per adolescent		
[4] STIR cost per adolescent		
[6] School social worker full-time equivalent (FTE) annual compensation		
Suggested Costs	Value	Source(s)
Prevention intervention cost per adolescent		
Cost of school-based prevention curriculum per student	\$52.00	Cost in 2008 dollars. Miller, T. and Hendrie, D. Substance Abuse Prevention Dollars and Cents: A Cost-Benefit Analysis, DHHS Pub. No. (SMA) 07-4298. Rockville, MD: Center for Substance Abuse Prevention, Substance Abuse and Mental Health Services Administration, 2008.
STIR cost per adolescent	\$72.73	Cost in 2017 dollars. Ohio Medicaid reimbursement rate for codes G0396 and G0397. Ohio Department of Medicaid. https://medicaid.ohio.gov/Provider/FeeScheduleandRates/SchedulesandRates#1682653-outpatient-hospital-behavioral-health-services .

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1A. Health Professional Education

	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1. Academic detailing																
[1] Total number of prescribers eligible to receive academic detailing in Trumbull County		468	472	475	479	482	486	490	493	497	501	504	508	512	516	520
[2] Proportion of prescribers to receive academic detailing		10.0%	9.6%	9.3%	8.9%	8.6%	8.2%	7.9%	7.5%	7.1%	6.8%	6.4%	6.1%	5.7%	5.4%	5.0%
[3] Total number of prescribers to receive academic detailing		47	45	44	43	41	40	38	37	35	34	32	31	29	28	26
[4] Total number of academic detailers needed		0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2. Continuing healthcare provider education																
[5] Total number of prescribers eligible for continuing professional education		468	472	475	479	482	486	490	493	497	501	504	508	512	516	520
[6] Total continuing healthcare provider education hours		1,872	943	950	957	965	972	979	986	994	1,001	1,009	1,017	1,024	1,032	1,040

Notes	Input	Source(s)
[1] Number of prescribers adjusted by annual employment growth rate starting in 2019		
Number of physicians and dentists	364	2019 data. Pediatricians are excluded. Health Resources and Services Administration. Area Health Resources Files. https://data.hrsa.gov/topics/health-workforce/ahrf .
Number of nurse practitioners	84	2019 data. Health Resources and Services Administration. Area Health Resources Files. https://data.hrsa.gov/topics/health-workforce/ahrf .
Number of physician assistants	13	2019 data. Health Resources and Services Administration. Area Health Resources Files. https://data.hrsa.gov/topics/health-workforce/ahrf .
Total number of prescribers	461	Sum of the number of physicians and dentists, nurse practitioners, and physician assistants.
Prescribing population annual employment growth	0.8%	2018 data. Weighted average of physicians, nurse practitioners, and physician assistants annual employment growth rates. 2018-2028 10-year employment growth rates were converted to annual employment growth rates. Ohio Department of Job and Family Services. https://ohiolmi.com/portals/206/pro/ohio/Ohio_Job_Outlook_2018-2028.pdf .
[2] Yearly estimate from 10.0% in year 1 to 5.0% in year 15	Yearly Estimate	In the U.S., 10% of providers account for nearly 90% of opioid prescriptions. Thus, the top 10% opioid prescribers of the prescribing population will be targeted in the first year and top 5% by year 15 of the abatement plan. Further described in paragraph #38 of expert witness report. Chang HY, Lyapustina T, Rutkow L, Daubresse M, Richey M, Faul M, Stuart EA, Alexander GC. Impact of Prescription Drug Monitoring Programs and Pill Mill Laws on High-Risk Opioid Prescribers: A Comparative Interrupted Time Series Analysis. Drug and Alcohol Dependence. 2016;165:1-8.
[3] = [1] * [2]		
[4] = [3] / 300	300	Number of unique prescribers visited by a detailer per year. Each prescriber will be visited four times each year (once per calendar quarter) by a detailer. 250 work days per year, but approximately one-fifth of the detailer time would be administrative. 6 prescribers per day * 200 work days / 4 visits per year. Expert opinion.
[5] = [1]		Same as number of prescribers.
[6] = [5] * health professional education hours per year		
Number of hours in year 1	4	Informed by National Institute on Drug Abuse. Health Professions Education, CME/CE Activities. https://www.drugabuse.gov/nidamed-medical-health-professionals/health-professionals-education/cme-ce-activities .
Number of hours in subsequent years	2	Informed by National Institute on Drug Abuse. Health Professions Education, CME/CE Activities. https://www.drugabuse.gov/nidamed-medical-health-professionals/health-professionals-education/cme-ce-activities .
Costs Description		
[4] Pharmacist full-time equivalent (FTE) annual compensation (an academic detailer is typically a pharmacist)		
[6] Weighted average of physicians, dentists, nurse practitioners, and physician assistants median hourly wage		

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18. Patient and Public Education

	Year														
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Mass media campaigns</u>															
[1] Total Trumbull County population aged 12 years and older	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301
[2] Proportion of Trumbull County population to be targeted by media campaigns	85.0%	84.3%	83.6%	82.9%	82.1%	81.4%	80.7%	80.0%	79.3%	78.6%	77.9%	77.1%	76.4%	75.7%	75.0%
[3] Total Trumbull County population to be targeted by media campaigns	143,906	142,697	141,487	140,278	139,069	137,860	136,650	135,441	134,232	133,022	131,813	130,604	129,395	128,185	126,976
Notes		Input	Source(s)												
[1]	All individuals aged 12 years and older residing in Trumbull County	169,301	2018 data. All individuals aged 12 years and older (86.7% in 2019 in Trumbull County). The Ohio Development Services Agency projects that the population of Trumbull County will decrease from 2020 (200,840 residents) through 2035 (189,810 residents). Given the change in population of the County, the population projection from 2020 to 2035 is averaged. (1) Ohio State Annual Estimates of the Resident Population by Single Year of Age and Sex: April 1, 2010 to July 1, 2019. U.S. Census Bureau, American Community Survey. https://www.census.gov/data/tables/time-series/demo/popest/2010s-state-detail.html . (2) Ohio Development Services Agency, Population Projections. https://development.ohio.gov/files/research/P6090.pdf .												
[2]	Yearly estimate from 85.0% in year 1 to 75.0% in year 15	Yearly Estimate	Proportion of Trumbull County population to be reached by mass media campaigns per year: 85.0% in year 1 and 75.0% by year 15 of the abatement plan. Informed by Centers for Disease Control and Prevention for an effective public health mass media campaign. King BA, Pechacek TF, Mariolis P. Centers for Disease Control and Prevention. Best Practices for Comprehensive Tobacco Control Programs— 2014. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014. https://www.cdc.gov/tobacco/stateandcommunity/best_practices/index.htm .												
[3]	= [1] * [2]														
Costs Description															
[3]	Mass media cost per capita														
Suggested Costs		Value	Source(s)												
The Real Cost campaign is a national tobacco public education campaign designed to prevent the initiation of cigarette smoking among youth aged 12 to 17 years. The Real Cost has appeared on national TV, radio, the Internet, and out-of-home displays, as well as in magazines and movie theaters. The central theme of the campaign is: "Every cigarette costs you something". MacMonagle AJ, Nonnemaker J, Duke JC, Farrelly MC, Zhao X, Delahanty JC, Smith AA, Rao P, Allen JA. Cost-Effectiveness Analysis of the Real Cost Campaign's Effect on Smoking Prevention. American Journal of Preventive Medicine. 2018;55:319-25.															
Campaign duration in months		24	While the campaign ran from 2013 to 2016, the intensive phase ran in 2014 and 2015.												
Campaign cost		\$205.3 M	Cost in 2014-2015 dollars for 24 months.												
Average cost per month		\$8.6 M	Campaign cost / Campaign duration in months.												
Campaign target population		271 M	National population age 12 years and older (average 2014-2015).												
Campaign cost per capita per year		\$0.38	Average cost per month / Campaign target population * 12 months.												

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4B. Adolescents and Young Adults

	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. School-based prevention programs</u>																
[1] Total number of adolescents eligible to receive prevention programs	16,002	16,002	16,002	16,002	16,002	16,002	16,002	16,002	16,002	16,002	16,002	16,002	16,002	16,002	16,002	16,002
[2] Proportion of adolescents to receive prevention programs	50.0%	47.9%	45.7%	43.6%	41.4%	39.3%	37.1%	35.0%	32.9%	30.7%	28.6%	26.4%	24.3%	22.1%	20.0%	
[3] Total number of adolescents to receive prevention programs	8,001	7,658	7,315	6,972	6,629	6,287	5,944	5,601	5,258	4,915	4,572	4,229	3,886	3,543	3,200	
<u>2. Adolescents OUD screening</u>																
[4] Total number of adolescents to receive STIR	535	511	488	466	445	425	406	388	370	354	338	323	308	294	281	
<u>3. School social workers</u>																
[5] Total number of public school students in Trumbull County	26,279	26,279	26,279	26,279	26,279	26,279	26,279	26,279	26,279	26,279	26,279	26,279	26,279	26,279	26,279	26,279
[6] Total number of school social workers needed	12.5	12.0	11.4	10.9	10.4	10.0	9.5	9.1	8.7	8.3	7.9	7.6	7.2	6.9	6.6	
[7] Intervention Population Trend Ratio	0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50	
OUD Opioid Use Disorder; STIR Screening, Treatment Initiation and Referral																
Notes	Input	Source(s)														
[1] All individuals aged 12 to 17 years old in Trumbull County	16,002	2018 data. All individuals aged 12 to 17 years old (7.0% in 2019 in Trumbull County). The Ohio Development Services Agency projects that the population of Trumbull County will decrease from 2020 (200,840 residents) through 2035 (189,810 residents). Given the change in population of the County, the population projection from 2020 to 2035 is averaged. (1) Ohio Development Services Agency, Population Projections. https://development.ohio.gov/files/research/P6090.pdf . (2) U.S. Census Bureau, American Community Survey.														
[2] Yearly estimate from 50.0% in year 1 to 20.0% in year 15	Yearly Estimate	Adolescent prevention programs should reach 50.0% of the adolescents in Trumbull County in year 1 and 20.0% by year 15. Expert opinion.														
[3] = [1] * [2]																
[4] = [1] * 3.5% * [7]	3.5%	2016-2018 data. All individuals aged 12 to 17 years in Trumbull County * Proportion of adolescents who reported current prescription opioid misuse. Estimated based on nonmedical use of pain relievers in the past year among individuals 12 to 17 years old (substate NSDUH, Ohio Boards 4 and 78 which includes county of interest). Substance Abuse and Mental Health Services Administration, 2016-2018 National Survey on Drug Use and Health. Rockville, MD: Center for Behavioral Health Statistics and Quality. https://www.samhsa.gov/data/sites/default/files/reports/rpt29376/NSDUHsubstateAgeGroupTabs2018/NSDUHsubstateAgeGroupTabs2018.pdf .														
[5] Total number of public school students in Trumbull County	26,279	2020 data. Trumbull County public school total students. National Center for Education Statistics. https://nces.ed.gov/ipeds/data/schoolsearch/school_list.asp?search=1&instate=&SchoolID=&Address=&City=&State=39&Zip=&Miles=&County=Trumbull&PhoneAreaCode=&Phone=&DistrictName=&DistrictID=&SchoolType=1&SchoolType=2&SchoolType=3&SchoolType=4&SpecificTypes=all&InGrade=-1&HiGrade=-1 .														
[6] = [5] / 2,000 * [7]	2,000	Caseload of public school students per opioid specialized school social worker. Informed by the School Social Work Association of America (SSWAA) recommendation of one school social worker to 250 general education students. https://aab82939-3e7b-497d-8f30-a85373757e29.filesusr.com/ugd/426a18_20108ba1b7444cada772fdbbb79dfe.pdf . (2) Expert opinion.														
[7] Retrieved from "Abatement Scaling" tab																

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Suggested Costs	Value	Source(s)
Prenatal screening cost per woman	\$63.50	Cost in 2017 dollars. Includes presumptive drug testing by instrumented chemistry analyzers (CPT Code H0048) and office/outpatient visit (CPT Code 99212). Ohio Department of Medical d. https://medical.d.ohio.gov/provider/freescheduleandrates/schedulesandrates#1682653-outpatient-hospital-behavioral-health-services .
NAS medical costs per infant		
Source #1	\$23,106	Cost in 2015 dollars. Loudin S, Werthammer J, Prunty L, Murray S, Shapiro JJ, Davies TH. A Management Strategy That Reduces NICU Admissions and Decreases Charges From the Front Line of the Neonatal Abstinence Syndrome Epidemic. <i>Journal of Perinatology</i> . 2017;37:1108-11.
Source #2	\$24,341	Cost in 2016 dollars. NAS hospitalization (ICD-10 Code P96.1 neonatal withdrawal symptoms from maternal use of drugs of addiction). U.S. Department of Health & Human Services, Agency for Healthcare Research and Quality. HCUPNet. http://hcupnet.ahrq.gov/#query/ejJBTRFMWVNUJ19UWVBFjgbikfUjX00XSwt1TUQ09NRVRNURFTVVVFUYi6WyjPTV9OVU1CRVILCIPT95QC/RFIwIT01FTG9TIIwIT01SENIIwIT01SENPiIwIT01FQUJIIIwIT01FQUJPII0SIIFQVTIjpbllSzcwMTYXS wUFJUTKNUEXF09SXOFMTCI6WwyQQV9LQUKIOQIQTEUXSwIQFURUDPUkIaQVRJT0SFVFIQRSISWYjDF9VQIQQMEQQSXiQ1RFSUNTBETIjpbllBMJUZI0SiKRBVEFRVRfU9VUukNFijgbikRTXO5JyjdffQ== .
Source #3	\$37,584	Cost in 2016 dollars. Milliren CE, Gupta M, Graham DA, Melvin P, Jorina M, Ozonoff A. Hospital Variation in Neonatal Abstinence Syndrome Incidence, Treatment Modalities, Resource Use, and Costs Across Pediatric Hospitals in the United States, 2013 to 2016. <i>Hospital Pediatrics</i> . 2018;8:15-20.

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1C. Safe Storage and Drug Disposal																	
		Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1. Drug take-back collection programs																	
[1]	Total Trumbull County population		195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273
[2]	Proportion of medications collected that are opioids		10.0%	9.6%	9.3%	8.9%	8.6%	8.2%	7.9%	7.5%	7.1%	6.8%	6.4%	6.1%	5.7%	5.4%	5.0%
Notes		Input	Source(s)														
[1]	All individuals residing in Trumbull County	195,273	2018 data. The Ohio Development Services Agency projects that the population of Trumbull County will decrease from 2020 (200,840 residents) through 2035 (189,810 residents). Given the change in population of the County, the population projection from 2020 to 2035 is averaged. Ohio Development Services Agency, Population Projections. https://development.ohio.gov/files/research/P6090.pdf .														
[2]	Yearly estimate from 10.0% in year 1 to 5.0% in year 15	Yearly Estimate	Proportion of opioids out of all medications collected at take-back programs: 10.0% in year 1 and 5.0% in year 15. Informed by medication take-back days in rural South Carolina. 13.3% (proportion of potentially abused medications returned out of all medications returned) * 65.0% (proportion of opioids returned out of all potentially abused medications returned) = 8.6%. Shealy KM, Ritter MS, Wyatt AS, Egerton DH. Trends in Potentially Abused Medications Returned During Medication Take-Back Days. Journal of the American Pharmacists Association. 2019;59:575-8.														
Costs Description																	
[1]	Cost of opioids disposal per capita per year * [2]																
Suggested Costs		Value	Source(s)														
Source #1: King County, WA			King County Department of Public Health. https://www.kingcounty.gov/depts/health/board-of-health/regulations/secure-medicine/~media/depts/health/board-of-health/documents/securemed/DefiningCostsResponsibility.ashx .														
	Operating cost per year	\$532,275	Cost in 2011 dollars.														
	County population	1,974,200	2011 data. U.S. Census us. https://www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html .														
	Cost per capita per year	\$0.27	Operating cost per year / County population.														
Source #2: Alameda County, CA			Dangi-Garimella S. Safe Disposal of Prescription Medications Faces a Cost Barrier. AJMC. 2016 May 04: https://www.ajmc.com/newsroom/safe-disposal-of-prescription-medications-the-cost-barrier .														
	Operating cost per year	\$330,000	Cost in 2015 dollars.														
	County population	1,634,538	2015 data. U.S. Census us. https://www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html .														
	Cost per capita per year	\$0.20	Operating cost per year / County population.														



1D. Community Prevention and Resiliency

	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Community resiliency coalition staffing</u>																
[1] Total number of directors needed		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
[2] Total number of community organizers needed		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
<u>2. Community resiliency coalition space</u>																
[3] Total number of community spaces		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<u>3. Community resiliency coalition funding</u>																
[4] Total Trumbull County population aged 12 years and older		169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301
Notes																
[1] = Total population in Trumbull County / 500,000	Input	0.4	I assume 1 full-time equivalent (FTE) director per 500,000 people to ensure adequate county coverage. Expert opinion.													
[2] = [1] * 3	3	I assume 3 FTE community organizers per director. Expert opinion.														
[3] = [1] * 1	1	I assume 1 community physical space to host forums, seminars, training sessions, and community meetings. Expert opinion.														
[4] Total Trumbull County population aged 12 and older	Yearly Estimate	Retrieved from tab "1B. Public Education", input [1].														
Costs Description																
[1] Director full-time equivalent (FTE) annual compensation																
[2] Community organizer FTE annual compensation																
[3] Community space with a seating capacity of 50 people																
[4] Total Trumbull County population aged 12 and older to be targeted by community resiliency initiatives * Cost per capita per year																
Suggested Costs		Value	Source(s)													
Community-based prevention programs cost per capita		Yearly Estimate	Cost in 2012 dollars. Represents cost per resident. Costs should be \$10.00 for the first year and then decrease by 10% for each subsequent year. Honeycutt AA, Khavjou OA, Bradley C, Neuwahl S, Hoerger TJ, Bellard D, Cash AJ. Intervention Costs From Communities Putting Prevention to Work. Preventing Chronic Disease. 2016;13:E98.													

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Number of live births in Ohio	134,560	2019 data. Ohio Department of Health, Ohio Public Health Information Warehouse. http://publicapps.odh.ohio.gov/EDW/DataBrowser/Browse/OhioLiveBirths .
Prevalence of OUD per 1,000 hospital deliveries in Ohio	32.1	2014 data. Informed by 2014 prevalence of OUD per delivery hospitalization in West Virginia. https://www.cdc.gov/mmwr/volumes/67/wr/mm6731a1.htm?s_cid=mm6731a1_w .
[3] = [2]		All pregnant women with OUD/new mothers with OUD should receive prenatal biopsychosocial services for one year, including intensive care coordination and support, given the complex challenges they face. Expert opinion.
[4] = Cumulative sum of [3] in the most recent 5 years (beginning year 2)		All new mothers with OUD should receive lower postpartum psychosocial services. The psychosocial services should last for a period of 5 years. Expert opinion.
[5] = [2] * 40.0%	40.0%	Housing services should be provided for a minimum of 12 months. Informed by (1) Brogly SB, Sala SK, Kelley E, Werler M, Regan E, Hernández-Díaz S. Prenatal Treatment and Outcomes of Women with Opioid Use Disorder. Obstetrics & Gynecology. 2018;132(4):916-922. (2) Expert opinion.
[6] = [1] * 24.1 per 1,000 * [12]	24.1	Number of hospital live births in Trumbull County * Rate of NAS per 1,000 hospital deliveries.
Number of NAS hospitalizations per year	50.6	2014-2018 data. Average number of yearly hospitalizations for NAS in Trumbull County from 2014 to 2018. 2018 Ohio Neonatal Abstinence Syndrome County Report. https://odh.ohio.gov/wps/wcm/connect/gov/b396a983-fa4e-4333-929c-1e9722cb4c38/2018-NAS+County+Table.pdf?MOD=AJPERES&COVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_M1HGGIK0N0JO0Q9DDDDM3000-b396a983-fa4e-4333-929c-1e9722cb4c38-m-fufpd .
[7] = [2] - [6]		Number of deliveries where the mother screens positive for opioids - Number of infants diagnosed with NAS in Trumbull County.
[8] = [6] + ([7] * 84.0%)	84.0%	Proportion of infants exposed to opioids but not diagnosed with NAS who should receive early intervention (age 0-5 years old). All infants diagnosed with NAS should receive early intervention (age 0-5 years old). Expert opinion.
[9] Cumulative sum of [8] until age 6 years old		Number of all infants diagnosed with NAS is used as a proxy for the number of infants exposed to opioids in utero but not diagnosed with NAS and number of infants diagnosed with NAS who need early intervention. Expert opinion.
[10] = [6] * 19.3% starting at age 6 years old	19.3%	Infants with NAS require special services and education starting at age 6 years old. (1) Expert opinion. (2) Informed by Fill MM, Miller AM, Wilkinson RH, Warren MD, Dunn JR, Schaffner W, Jones TF. Educational Disabilities Among Children Born With Neonatal Abstinence Syndrome. Pediatrics. 2018;142:e20180562.
[11] Cumulative sum of [10] starting at age 6 years old		
[12] Retrieved from "Abatement Scaling" tab		
Costs Description		
[1] Prenatal screening cost per woman		
[3] Prenatal psychosocial services cost per woman		
[4] Postpartum psychosocial services cost per woman		
[5] Housing services cost per mother		
[6] NAS medical costs per infant		
[9] Early intervention cost per child (age 0-5 years old)		
[11] Special education and psychosocial services cost per child (age 6-21 years old)		

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4A. Pregnant Women, New Mothers, and Infants

	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Prenatal OUD screening</u>																
[1] Total number of pregnant women eligible to receive universal prenatal screening		2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099
<u>2. Prenatal and postpartum psychosocial services</u>																
[2] Total number of pregnant women with OUD		64	61	59	56	54	51	49	47	45	43	41	39	37	35	34
[3] Number of pregnant women with OUD/new mothers with OUD eligible to receive prenatal psychosocial services		64	61	59	56	54	51	49	47	45	43	41	39	37	35	34
[4] Number of new mothers with OUD to receive postpartum psychosocial services		0	64	126	185	241	294	281	268	256	245	234	223	213	204	195
<u>3. Prenatal and postpartum housing services</u>																
[5] Number of pregnant women with OUD/new mothers with OUD eligible to receive housing services		26	25	23	22	21	20	20	19	18	17	16	16	15	14	14
<u>4. Interventions for infants exposed to opioids in utero</u>																
[6] Total number of infants diagnosed with NAS to receive medical care		48	46	44	42	40	38	37	35	33	32	31	29	28	27	25
[7] Total number of infants exposed to opioids but not diagnosed with NAS		16	15	15	14	13	13	12	12	11	11	10	10	9	9	8
[8] Number of children eligible to receive early intervention (age 0-5 years old)		62	59	56	54	51	49	47	45	43	41	39	37	36	34	32
[9] Total number of children eligible to receive early intervention (age 0-5 years old)		62	121	177	231	282	332	317	302	289	276	264	252	240	230	219
[10] Number of children eligible to receive special education and psychosocial services (age 6-21 years old)		0	0	0	0	0	0	9	9	9	8	8	7	7	7	6
[11] Total number of children eligible to receive special education and psychosocial services (age 6-21 years old)		0	0	0	0	0	0	9	18	27	35	43	50	57	64	70
[12] Intervention Population Trend Ratio		0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50
OUD Opioid Use Disorder; NAS Neonatal Abstinence Syndrome																
Notes	Input	Source(s)														
[1] Number of hospital live births in Trumbull County	2,099	2017 data. All pregnant women will be eligible for prenatal screening. (1) 2018-2019 Trumbull County Community Health Assessment number of live births. https://www.warren.org/images/PDFs/health-department/2018-2019_Trumbull_County_CHA_6-4-19.pdf . (2) Substance Abuse and Mental Health Services Administration. Clinical Guidance for Treating Pregnant and Parenting Women With Opioid Use Disorder and Their Infants. HHS Publication No. (SMA) 18-5054. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2018.														
[2] = [1] * 32.1 per 1,000 * [12]	67.4	Number of hospital live births in Trumbull County * Prevalence of OUD per 1,000 hospital deliveries														
Pregnant women with OUD at delivery in Ohio	2,031	2016-2018 data. Average number of women per year who are diagnosed with OUD at delivery between 2016 and 2018. Ohio Department of Health. 2018 Neonatal Abstinence Syndrome Report. https://odh.ohio.gov/wps/wcm/connect/gov/230fd880-662d-42e4-9f00-0a0e70953ce9/NAS+2018+Table+REVISED+12.13.2019.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_M1HGGIK0N0J00Q9DDDDM3000-230fd880-662d-42e4-9f00-0a0e70953ce9-mY0MqN .														

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1E. Harm Reduction

	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Syringe service programs (SSPs)</u>																
[1] Total number of opioid injection drug users		1,375	1,314	1,255	1,198	1,144	1,093	1,044	997	952	910	869	830	793	757	723
[2] Proportion of opioid injection drug users reached by SSPs		30.0%	33.2%	36.4%	39.6%	42.9%	46.1%	49.3%	52.5%	55.7%	58.9%	62.1%	65.4%	68.6%	71.8%	75.0%
[3] Total number of opioid injection drug users reached by SSPs		413	436	457	475	490	504	515	524	531	536	540	542	543	543	542
<u>2. Drug checking machines</u>																
[4] Total number of drug checking machines needed		9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<u>3. Fentanyl testing strips</u>																
[5] Total number of opioid injection drug users		1,375	1,314	1,255	1,198	1,144	1,093	1,044	997	952	910	869	830	793	757	723
[6] Proportion of opioid injection drug users to receive fentanyl testing strips		30.0%	33.2%	36.4%	39.6%	42.9%	46.1%	49.3%	52.5%	55.7%	58.9%	62.1%	65.4%	68.6%	71.8%	75.0%
[7] Total number of opioid injection drug users to receive fentanyl testing strips		413	436	457	475	490	504	515	524	531	536	540	542	543	543	542
[8] Total number of fentanyl testing strips needed per day		413	436	457	475	490	504	515	524	531	536	540	542	543	543	542
[9] Total number of fentanyl testing strips needed per year		150,592	159,243	166,813	173,383	179,027	183,815	187,812	191,080	193,676	195,654	197,064	197,953	198,366	198,342	197,921
[10] Intervention Population Trend Ratio		0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50
SSPs Syringe Service Programs																
Notes	Input	Source(s)														
[1] Intravenous opioid use population per year in Trumbull County * Adjustment for intravenous opioid use underestimation * [10]	762	2016-2018 data. 0.45% of Trumbull County individuals aged 12 years and older used heroin in the past year based on 2016-2018 survey results (substate NSDUH Ohio Boards 4 and 78 which includes county of interest). 0.45% * Trumbull County 2018 population aged 12 and older. Substance Abuse and Mental Health Services Administration. 2016-2018 National Survey on Drug Use and Health (NSDUH) Substate Age Group Tables. Rockville, MD: Center for Behavioral Health Statistics and Quality. https://www.samhsa.gov/data/report/2016-2018-nsduh-substate-region-estimates-tables .														
Adjustment for intravenous opioid use underestimation	1.9	2010-2016 data. The NSDUH past month heroin use estimate in Trumbull County is conservatively estimated to be no less than 1.9 times higher to account for NSDUH underestimation and exclusion of homeless people who do not use shelters and institutionalized populations. Informed by the difference in the National RAND corporation estimated monthly chronic heroin use population and National NSDUH past month heroin use population in 2016. (1) Midgett G, Davenport S, Caulkins JP, Kilmer B. What America's Users Spend on Illegal Drugs, 2006-2016. Published 2019. https://www.rand.org/pubs/research_reports/RR3140.html . (2) Substance Abuse and Mental Health Services Administration, 2010-2019 National Survey on Drug Use and Health. Rockville, MD: Center for Behavioral Health Statistics and Quality. (3) Expert opinion.														
[2] Yearly estimate from 30.0% in year 1 to 75.0% in year 15	Yearly Estimate	Informed by the proportion (54%) of people who inject drugs and reported in 2015 they used an SSP in the past year nationally. 75.0% represents the expected increase in coverage. Centers for Disease Control and Prevention. https://www.cdc.gov/media/releases/2016/p1129-hiv-syringe-services.html .														
[3] = [1] * [2]																
[4] Number of drug checking machines needed	9.0	One machine for every four police departments (20 departments in Trumbull county) and two machines for every SSP. Equipment investment is only needed in year 1 of the abatement plan. Informed by TI L, Tobias S, Lysyshyn M, Laing R, Nosova E, Choi J, Arredondo J, McCrae K, Tupper K, Wood E. Detecting Fentanyl Using Point-Of-Care Drug Checking Technologies: A Validation Study. Drug and Alcohol Dependence. 2020;212:108006.														
Number of police departments	20	Retrieved from tab "3A. Public Safety", input [1].														
Number of SSPs	2	Assuming one permanent site and one mobile van. Expert opinion.														

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[5] = [1]	Same as number of opioid injection drug users in Trumbull County.	
[6] = [2]	Same as proportion of opioid injection drug users reached by SSPs.	
[7] = [5] * [6]		
[8] = [7] * 1	1	Number of fentanyl testing strips needed per person per day. Majority of heroin users reported daily injection nationally. Colledge S, Leung J, Lamey S, Peacock A, Grebely J, Hickman M, Cunningham E, Trickey A, Stone J, Vickerman P, Degenhardt L. Frequency of Injecting Among People Who Inject Drugs: A Systematic Review and Meta-Analysis. International Journal of Drug Policy. 2020;76:102619.
[9] = [8] * 365 days	365	
[10] Retrieved from "Abatement Scaling" tab		
Costs Description		
[3] SSP cost per client		
[4] Cost per drug checking machine for year 1 + recurring maintenance per year (clinical laboratory technician full-time equivalent annual compensation)		
[9] Cost per fentanyl testing strip		
Suggested Costs	Value	Source(s)
SSP cost per client	\$774.30	Cost in 2016 dollars. A medium-size suburban SSP is defined as an SSP that serves approximately 1,250 clients per year and location in a geographic area with 50,000–1.0 million people. Teshale EH, Asher A, Aslam MV, Augustine R, Duncan E, Rose-Wood A, Ward J, Mermin J, Owusu-Edusei K, Dietz PM. Estimated Cost of Comprehensive Syringe Service Program in the United States. PLoS one. 2019;14(4).
Cost per drug checking machine	\$20,000	Cost in 2018 dollars. Gary Gately. (2018) How Drug Checking Could Prevent Fentanyl Overdoses. Hopkins Bloomberg Public Health Magazine. https://magazine.jhsph.edu/2018/how-drug-checking-could-prevent-fentanyl-overdoses .
Cost per fentanyl testing strip	\$1.00	Cost in 2020 dollars. Next Naloxone. https://www.naloxoneforall.org/fentanyl .

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Monument Analytics

A Health Care Consultancy

3D. Mental Health Counseling and Grief Support

	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Mental health counseling</u>																
[1] Total Trumbull County population aged 12 years and older	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301	169,301
[2] Total number of individuals with chronic pain	34,537	34,537	34,537	34,537	34,537	34,537	34,537	34,537	34,537	34,537	34,537	34,537	34,537	34,537	34,537	34,537
[3] Total number of individuals to receive mental health counseling	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944
<u>2. Grief support</u>																
[4] Total number of opioid-related deaths	91	87	83	79	76	72	69	66	63	60	58	55	53	50	48	
[5] Total number of bereaved family members to receive grief support	210	200	191	183	175	167	159	152	145	139	133	127	121	115	110	
<u>3. Mental health counselors</u>																
[6] Total number of counselors needed to deliver mental health and grief support	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
[7] Intervention Population Trend Ratio	0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50	

Notes	Input	Source(s)
[1] All individuals aged 12 years and older residing in Trumbull County		Retrieved from tab "18. Public Education", Input [1].
[2] = [1] * 20.4% * [7]	20.4%	2016 data. An estimated 20.4% of U.S. adults experience chronic pain. Dahlhamer J, Lucas J, Zelaya C, Nahin R, Mackey S, DeBar L, Kerns R, Von Korff M, Porter L, Helmick C. Prevalence of Chronic Pain and High-Impact Chronic Pain Among Adults —United States, 2016. Morbidity and Mortality Weekly Report. 2018;67:1001.
[3] = [2] * 23.0%	23.0%	Informed by Hooten WM. Chronic Pain and Mental Health Disorders: Shared Neural Mechanisms, Epidemiology, and Treatment. Mayo Clinic Proceedings. 2016;91:955-970.
[4] Number of opioid-related deaths in Trumbull County * [7]	96	Average of 2016 to 2019 data. Centers for Disease Control and Prevention. CDC WONDER Online Database. http://wonder.cdc.gov/mcd-lcd10.html .
[5] = [4] * 2.3	2.3	Median household size in Trumbull County. 2015-2019 data. U.S. Census Bureau. American Community Survey, 5-Year Estimates. https://www.census.gov/quickfacts/trumbullcountyohio .
[6] = ([3] + [5]) / 1,500	1,500	Number of unique patients per counselor per year. 6 patients per day * 250 work days / 1 sessions per month. Expert opinion.
[7] Retrieved from "Abatement Scaling" tab		
Costs Description		
[6] Mental health counselor full-time equivalent annual compensation		

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3C. Vocational Training, Education, and Job Placement

	Year														
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1. Vocational training programs															
[1] Total number of individuals with OUD to receive treatment	2,888	2,857	2,823	2,786	2,747	2,706	2,662	2,618	2,572	2,524	2,476	2,427	2,378	2,328	2,278
[2] Total number of individuals with OUD to receive vocational training	1,412	1,397	1,380	1,362	1,343	1,323	1,302	1,280	1,258	1,234	1,211	1,187	1,163	1,138	1,114
OUD Opioid Use Disorder															
Notes	Input	Source(s)													
[1] Number of individuals with OUD in Trumbull County to receive treatment	Yearly Estimate	Retrieved from tab "28. OUD Treatment", input [3].													
[2] = [1] * 48.9%	48.9%	2018 data. Proportion of individuals unemployed among individuals admitted to treatment for opioid related admissions in Ohio in 2018. Substance Abuse and Mental Health Services Administration. 2018 Treatment Episode Data Set (TEDS). Rockville, MD: Center for Behavioral Health Statistics and Quality.													
Costs Description															
[2] Vocational training cost per person															
Suggested Costs	Value	Source(s)													
Vocational training cost per person	\$2,765	Cost in 2017 dollars. Employment counseling and job training with paid work experience in the community. Washington State Institute for Public Policy. The Effectiveness of Reentry Programs for Incarcerated Persons: Findings for the Washington Statewide Reentry Council. http://www.wsipp.wa.gov/ReportFile/1667/Wsipp_The-Effectiveness-of-Reentry-Programs-for-Incarcerated-Persons-Findings-for-the-Washington-Statewide-Reentry-Council_Report.pdf .													

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1F. Surveillance, Evaluation, and Leadership

	Year														
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Opioid Abatement Coordinating Unit</u>															
[1] Total number of directors needed	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
[2] Total number of managers needed	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
[3] Total number of data scientists needed	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
[4] Total number of community liaisons needed	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
[5] Total number of staff assistants needed	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Notes	Input	Source(s)													
[1] = Total population in Trumbull County / 500,000	0.4	I assume 1 full-time equivalent (FTE) director per 500,000 people to ensure adequate county coverage. Expert opinion.													
[2] = [1] * 1	1	I assume 1 FTE manager per director. Expert opinion.													
[3] = [1] * 4	4	I assume 4 FTE data scientists per director. Expert opinion.													
[4] = [1] * 1	1	I assume 1 FTE community liaison per director. Expert opinion.													
[5] = [1] * 1	1	I assume 1 FTE staff assistant per director. Expert opinion.													
Costs Description															
[1] Director full-time equivalent (FTE) annual compensation															
[2] Manager FTE annual compensation															
[3] Data scientist FTE annual compensation															
[4] Community liaison FTE annual compensation															
[5] Staff assistant FTE annual compensation															

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**2A. Connecting Individuals to Care**

	Year														
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Helpline</u>															
[1] Total number of helpline staff members	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<u>2. Peer recovery coaches</u>															
[2] Total number of peer recovery coaches needed	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
<u>3. Transportation assistance</u>															
[3] Total number of patients in need of transportation assistance for outpatient OUD treatment	494	523	552	579	604	628	650	671	691	709	726	741	755	768	779
[4] Total number of transportation vouchers needed for patients receiving outpatient OUD treatment per year	25,682	27,220	28,688	30,083	31,404	32,650	33,820	34,915	35,934	36,877	37,747	38,543	39,267	39,920	40,505
[5] Total number of patients in need of transportation assistance for intensive outpatient OUD treatment	217	231	243	255	266	276	286	296	304	312	320	326	333	338	343
[6] Total number of transportation vouchers needed for patients receiving intensive outpatient OUD treatment per year	45,237	47,946	50,531	52,988	55,315	57,510	59,571	61,499	63,294	64,956	66,487	67,889	69,165	70,316	71,345
[7] Total number of transportation vouchers needed per year	70,919	75,166	79,219	83,071	86,719	90,160	93,392	96,414	99,228	101,833	104,234	106,432	108,431	110,236	111,850
<u>4. Quick Response Teams (QRTs)</u>															
[8] Total number of opioid-related ED visits and hospitalizations	446	426	407	389	371	355	339	323	309	295	282	269	257	246	234
[9] Total number of QRTs needed	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
[10] Total number of addiction counselors for QRTs	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
[11] Total number of first responders for QRTs	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
[12] Total number of peer recovery coaches for QRTs	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
<u>5. Bridge programs</u>															
[13] Total number of EDs to establish Bridge programs	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
[14] Intervention Population Trend Ratio	0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50

OUD Opioid Use Disorder; QRT Quick Response Team; ED Emergency Department

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Suggested Costs	Value	Source(s)
Reentry cost per person	\$2,434	Cost in 2017 dollars. Employment counseling and job training (transitional reentry from incarceration into the community). Washington State Institute for Public Policy. The Effectiveness of Reentry Programs for Incarcerated Persons: Findings for the Washington Statewide Reentry Council. http://www.wsipp.wa.gov/ReportFile/1667/Wsipp_The-Effectiveness-of-Reentry-Programs-for-Incarcerated-Persons-Findings-for-the-Washington-Statewide-Reentry-Council_Report.pdf .

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3B. Criminal Justice System

	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. Opioid drug courts</u>																
[1] Total number of opioid drug courts participants		48	76	122	134	148	163	179	197	216	238	262	288	317	349	383
<u>2. Reentry and reintegration</u>																
[2] Total number of individuals released from jail/prison with OUD		189	181	173	165	158	150	144	137	131	125	120	114	109	104	100
<u>3. Transitional housing for newly released</u>																
[3] Total number of individuals released from jail/prison with OUD eligible to receive transitional housing		57	54	52	49	47	45	43	41	39	38	36	34	33	31	30
[4] Intervention Population Trend Ratio		0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50
OUD Opioid Use Disorder																
Notes		Input	Source(s)													
[1] Number of opioid drug courts participants per year		30	Number of Trumbull County treatment court participants that report heroin or prescription opioids as their primary drug of choice.													
Number of drug courts participants per year		92	2019 data. 150,000 drug courts participants nationally * 0.06% (proportion of Trumbull County, 200,840 in 2020 of the total 2019 U.S. Census population, 328,239,523). National Drug Court Month Toolkit Stories Worth Telling. National Association of Drug Court Professionals. May 2021. https://www.nadcp.org/wp-content/uploads/2021/04/NDCM-Toolkit-2021-4-6.pdf .													
Proportion of drug courts population with opioid as the primary substance of nonmedical use		32.5%	2016 data. Based on national average of 34% (suburban drug courts) and 31% (rural drug courts). Marlowe, Douglas B, Carolyn D. Hardin, and Carson L. Fox. Painting the Current Picture: A National Report on Drug Courts and Other Problem-Solving Courts in the United States. National Drug Court Institute. https://www.ndci.org/wp-content/uploads/2016/05/Painting-the-Current-Picture-2016.pdf . Published Jun 2016.													
Opioid drug courts capacity growth rate, years 1 to 3		60.0%	Opioid drug court capacity will be increased by 60.0% each year from year 1 through year 3. Expert opinion.													
Opioid drug courts capacity growth rate, years 4 to 15		10.0%	Opioid drug court capacity will be increased by 10.0% each year from year 4 through year 15. Expert opinion.													
[2] Number of individuals released from jail/prison with OUD * [4]		198	Number of individuals released from jail/prison per year * Percentage of individuals in jail or prison with OUD.													
Number of individuals released from jail/prison per year		308	2015 data. Number of individuals released from jail/prison that were committed by Trumbull County. Ohio Department of Rehabilitation & Correction. Releases in CY 2015 by County of Admission. https://drc.ohio.gov/bureau-of-research .													
Percentage of individuals in jail/prison with OUD		65.4%	2019 data. 65.4% of inmates in Ohio screened positive for buprenorphine and opiates. Ohio Department of Rehabilitation & Correction. 2019 Annual Report. https://www.drc.ohio.gov/Portals/0/Annual%20Report%20for%20the%20DRC.pdf .													
[3] = [2] * 30.0%		30.0%	Proportion of individuals released from jail/prison with OUD needing transitional housing per year. Transitional housing services should be provided for a minimum of 9 months. Informed by (1) National Alliance on Mental Illness. Reentry After A Period Of Incarceration. https://www.nami.org/Find-Support/Living-with-a-Mental-Health-Condition/Reentry-After-a-Period-of-Incarceration . (2) Expert opinion.													
[4] Retrieved from "Abatement Scaling" tab																
Costs Description																
[1] Drug court cost per participant (excluding treatment cost)																
[2] Reentry cost per person																
[3] Transitional housing cost per person																


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Notes	Input	Source(s)
[1] Number of full-time equivalent (FTE) helpline staff	3	Three 8-hour shifts to maintain 24/7 hotline coverage by licensed clinical social worker-level staff and/or crisis intervention specialists. Informed by Substance Abuse and Mental Health Services Administration. National Helpline. https://www.samhsa.gov/find-help/national-helpline .
[2] Total number of peer recovery coaches needed per year	16	Total sum of number of peer recovery coaches needed for EDs, SSPs, recovery houses, and OTPs.
Number of EDs in Trumbull County	3	2020 data. State of Ohio Office of Research. Ohio County Profiles – Trumbull County. https://development.ohio.gov/files/research/C1079.pdf .
Number of peer recovery coaches needed per ED	2	Each ED should have 2 FTE peer recovery coaches. Expert opinion.
Number of syringe service programs (SSPs) in Trumbull County	2	Retrieved from tab "1E. Harm Reduction", input [4] notes.
Number of peer recovery coaches needed per SSP	2	Each SSP should have 2 FTE peer recovery coaches. Expert opinion.
Number of recovery houses in Trumbull County	10	2021 data. Trumbull County Mental Health and Recovery Board. http://www.trumbullmhrb.org/pdfs/Resource%20Booklet.pdf .
Number of peer recovery coaches needed per recovery house	0.25	Every 4 recovery houses should have 1 FTE peer coach. Expert opinion.
Number of opioid treatment programs (OTPs) in Trumbull County	3	2020 data. Substance Abuse and Mental Health Services Administration. Opioid Treatment Program Directory. https://dpt2.samhsa.gov/treatment/directory.aspx .
Number of peer recovery coaches needed per OTP	1	Each OTP should have 1 FTE peer coach. Expert opinion.
[3] Number of individuals with OUD in outpatient treatment settings	Yearly Estimate	Retrieved from tab "2B. OUD Treatment", input [9].
[4] = [3] * 1 voucher per week * 52 weeks	52	One voucher per week. Center for Substance Abuse Treatment. Substance Abuse: Administrative Issues in Outpatient Treatment. Treatment Improvement Protocol (TIP) Series 46. DHHS Publication No. (SMA) 06-4151. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2006. https://store.samhsa.gov/product/TIP-46-Substance-Abuse-Administrative-Issues-in-Outpatient-Treatment/SMA12-4151?referrer=from_search_result .
[5] Number of individuals with OUD in intensive outpatient treatment settings	Yearly Estimate	Retrieved from tab "2B. OUD Treatment", input [10].
[6] = [5] * 4 vouchers per week * 52 weeks	208	Four vouchers per week. Center for Substance Abuse Treatment. Substance Abuse: Clinical Issues in Intensive Outpatient Treatment. Treatment Improvement Protocol (TIP) Series 47. DHHS Publication No. (SMA) 06-4182. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2006. https://store.samhsa.gov/product/TIP-47-Substance-Abuse-Clinical-Issues-in-Intensive-Outpatient-Treatment/SMA13-4182 .
[7] = [4] + [6]		
[8] Number of opioid-related ED visits and hospitalizations in Trumbull County * [14]	467	2019 data. Ohio Hospital Association. OHA Data Release: Opioid Overdoses. https://ohiohospitals.org/Patient-Safety-Quality/Statewide-Initiatives/Opioid-Initiative/OHA-Overdose-Data-Sharing-Program .
[9] = [8] / 972	972	QRT caseload is based on an average of 972 overdose referrals per year (81 referrals per month). Informed by (1) Cover2 Resources, Summit County QRT. https://cover2.org/programs/quick-response-teams/ . (2) Huntington Quick Response Team. https://www.opioidlibrary.org/wp-content/uploads/2019/08/QRT-Larrecsa-Cox.pdf .
[10] = [9]		Each QRT should include an addiction counselor. Expert opinion.
[11] = [9]		Each QRT should include a first responder. Expert opinion.

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[12] = [9]	Each QRT should include a peer recovery coach. Expert opinion.	
[13] Number of EDs in Trumbull County	3	Retrieved from input [2] notes.
[14] Retrieved from "Abatement Scaling" tab		
Costs Description		
[1] Crisis intervention specialist full-time equivalent (FTE) annual compensation		
[2] Peer recovery coach FTE annual compensation		
[7] Cost per transportation voucher (round trip)		
[10] Addiction counselor FTE annual compensation		
[11] First responder FTE annual compensation		
[12] Peer recovery coach FTE annual compensation		
[13] Bridge Program cost per ED		
Suggested Costs	Value	Source(s)
Bridge Program cost per ED	\$173,333	Cost in 2018 dollars. California Bridge Program available funding for a Star Site for 12 months. Public Health Institute. http://www.phi.org/wp-content/uploads/migration/uploads/files/CA%20Bridge%20Program_SITE%20SELECTION%20RFA_16Nov2018.pdf .

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Monument Analytics

A Health Care Consultancy

3A. Public Safety

	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1. Law Enforcement Assisted Diversion (LEAD)																
[1] Total number of LEAD programs to be established for police departments		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2. Specialized Opioid Investigators																
[2] Total number of specialized opioid investigators		1.9	1.8	1.7	1.7	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.0
3. Stigma reduction training																
[3] Total number of law enforcement officers to receive stigma reduction training		624	623	622	621	620	618	617	616	615	614	613	612	611	610	609
[4] Total number of hours for stigma reduction training		1,871	1,868	1,865	1,862	1,859	1,855	1,852	1,849	1,846	1,843	1,840	1,837	1,834	1,831	1,828
[5] Intervention Population Trend Ratio		0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50


LEAD Law Enforcement Assisted Diversion

Notes	Input	Source(s)
[1] Number of police and sheriff departments to establish LEAD	5.0	Every 4 police departments will share a LEAD program. Expert opinion.
Number of police departments in Trumbull County	20	USA COPS. The Nation's Law Enforcement Site. https://www.usacops.com/oh/trumbull.html .
[2] = Number of specialized opioid investigators * [5]	2	(1) Informed by Baltimore (5 detectives) [https://www.washingtonpost.com/local/public-safety/baltimore-homicide-detectives-to-begin-investigating-drug-overdoses/2017/05/02/90d7fd66-2f52-11e7-9534-00e4656c22aa_story.html?utm_term=.4cc511878227]. Published May 2, 2017] and Boston (13 detectives) [https://www.bostonglobe.com/metro/2016/03/31/new-boston-police-opioid-unit-focuses-treatment-not-just-arrests/6sLSQdZvBwccHMBuXEAAK/story.html]. Published Mar 31, 2016]. (2) Expert opinion.
[3] Number of law enforcement officers to receive stigma reduction training, adjusted by annual employment growth rate starting in 2020		Retrieved from tab "2D. Workforce Expansion", input [6] notes.
Number of police officers	509	2020 data. (1) Ohio Department of Rehabilitation & Correction 2020 Annual Report number of correctional officers in Ohio (5,808). https://drc.ohio.gov/Portals/0/ODRC%20FY2020%20Annual%20Report%202%202%281%29.pdf . (2) Estimate is scaled down by proportion of Trumbull county population (197,974) relative to Ohio (11,689,100) in 2019 (1.7%). Centers for Disease Control and Prevention. CDC WONDER Online Database. http://wonder.cdc.gov/mcd-icd10.html .
Number of correctional officers	116	Sum of the number of police officers and correctional officers.
Number of law enforcement officers	625	Weighted average of police officers and correctional officers annual employment growth rates. 2018-2028 10-year employment growth rates were converted to annual employment growth rates. Ohio Department of Job and Family Services. https://ohiolmi.com/portals/206/Proj/Ohio/Ohio_Job_Outlook_2018-2028.pdf .
Law enforcement annual employment growth rate	-0.2%	
[4] = [3] * 3 hours	3	A 3-hour long stigma reduction training should be provided annually. The Harm Reduction Coalition Understanding Drug-Related Stigma Tools for Better Practice and Social Change. https://harmreduction.org/wp-content/uploads/2012/02/stigma-facilitators.pdf .
[5] Retrieved from "Abatement Scaling" tab		
Costs Description		
[1] Cost per LEAD program		
[2] Investigator full-time equivalent (FTE) annual compensation		
[4] Weighted average of police officers and correctional officers median hourly wage		

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[6] = [5] * 2 doses per opioid-related ED visit or hospitalization	2	Number of generic injectable naloxone doses per opioid-related ED visit or hospitalization per year. Informed by Massey J, Kilkenny M, Batdorf S, Sanders SK, Ellison D, Halpin J, Gladden RM, Bixler D, Haddy L, Gupta R. Opioid Overdose Outbreak—West Virginia, August 2016. Morbidity and Mortality Weekly Report. 2017;66:975.
[7] Number of individuals with OUD	Yearly Estimate	Retrieved from tab "2B. OUD Treatment", Input [1].
[8] Yearly estimate from 20.0% in year 1 to 50.0% in year 15	Yearly Estimate	Informed by (1) Samuels EA, Balrd J, Yang ES, Mello MJ. Adoption and Utilization of an Emergency Department Naloxone Distribution and Peer Recovery Coach Consultation Program. Academic Emergency Medicine. 2015;26:160-73. (2) Centers for Disease Control and Prevention. CDC Guideline for Prescribing Opioids for Chronic Pain. https://www.montcopa.org/DocumentCenter/View/12973/CDCGuideline_At-A-Glance?bidid=
[9] = [7] * [8]		
[10] = [9] * 1 naloxone kit per OUD patient	1	Number of naloxone kits per OUD patient per year. Each kit should consist of a bag that can hold the Narcan® doses, 2 CPR face shields, and relevant educational materials. Samuels EA. Emergency Department Naloxone Distribution: A Rhode Island Department of Health, Recovery Community, and Emergency Department Partnership to Reduce Opioid Overdose Deaths. Rhode Island Medical Journal. 2014;97:38-39.
[11] = [9] * 2 doses per OUD patient	2	Number of Narcan® doses per OUD patient per year. Samuels EA. Emergency Department Naloxone Distribution: A Rhode Island Department of Health, Recovery Community, and Emergency Department Partnership to Reduce Opioid Overdose Deaths. Rhode Island Medical Journal. 2014;97:38-39.
[12] Total Trumbull County population	Yearly Estimate	Retrieved from tab "1C. Drug Disposal", Input [1].
[13] = [12] / 1,000	1,000	Population per one naloxone box per city. Informed by a similar recommendation by the American Heart Association for having 1 automated external defibrillator (AED) per 1,000 person-years. American Heart Association. International CPR and ECC Guidelines Part 4: The Automated External Defibrillator: Key Link in the Chain of Survival. Circulation. 2000;102 (Supplement 1).
[14] = [13] * 2 doses per naloxone box	2	Number of Narcan® doses per public lock box. Informed by Capraro GA, Rebola CB. The Naloxone Program in Rhode Island: A Model for Community-Access Naloxone. American Journal of Public Health. 2018;108:1649-1651.
Replacement frequency of Narcan® doses of naloxone public lock boxes	Every 3 years	Narcan® for public lock boxes is replaced every three years (shelf-life of naloxone). Emergent BioSolutions Announces FDA Approval of NARCAN Nasal Spray Shelf Life Extension to 36 Months. https://www.globenewswire.com/news-release/2020/08/17/2079086/0/en/Emergent-BioSolutions-Announces-FDA-Approval-of-NARCAN-naloxone-HCI-Nasal-Spray-Shelf-Life-Extension-to-36-Months.html
Costs Description		
[3] Weighted average of firefighters, EMTs and paramedics, and police officers median hourly wage		
[4] Narcan® dose cost for first responders		
[6] Generic injectable naloxone dose cost		
[10] Take-home kit cost		
[11] Narcan® dose cost		
[13] Naloxone public lock box (excluding Narcan®) cost		
[14] Narcan® dose cost		
Suggested Costs	Value	Source(s)
First responders Nasal spray (Narcan®) single use spray cost	\$37.50	Cost in 2020 dollars. ADAPT Pharma. https://www.narcan.com/first-responders/what-is-narcan-nasal-spray/ .
Generic injectable naloxone cost per dose	\$11.21	Cost in 2021 dollars. NALOXONE 4 MG/10 ML VIAL. National Average Drug Acquisition Cost. Updated April 6, 2021. https://data.medicaid.gov/Drug-Pricing-and-Payment/NADAC-National-Average-Drug-Acquisition-Cost-/a4y5-998d .
Nasal spray (Narcan®) single-use spray cost	\$59.94	Cost in 2021 dollars. NARCAN 4 MG NASAL SPRAY. National Average Drug Acquisition Cost. Updated April 6, 2021. https://data.medicaid.gov/Drug-Pricing-and-Payment/NADAC-National-Average-Drug-Acquisition-Cost-/a4y5-998d .
Take-home kit cost	\$8.19	Cost in 2021 dollars. Emergent Medical Products. https://www.buyemp.com/ .
Naloxone public lock box without naloxone cost	\$275.00	Cost in 2021 dollars. Naloxone generally stocked with the Narcan® formulation of naloxone. This cost is exclusive to the Naloxone without medication. https://naloxone.org/products/naloxone-standard .


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2B. Treatment for Opioid Use Disorder															
	Year														
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1. ASAM levels of care for OUD treatment															
[1] Total number of individuals with OUD	7,221	6,897	6,587	6,291	6,009	5,739	5,481	5,235	5,000	4,776	4,562	4,357	4,161	3,974	3,796
[2] Proportion of individuals with OUD to receive treatment*	40.0%	41.4%	42.9%	44.3%	45.7%	47.1%	48.6%	50.0%	51.4%	52.9%	54.3%	55.7%	57.1%	58.6%	60.0%
[3] Total number of individuals with OUD to receive treatment	2,888	2,857	2,823	2,786	2,747	2,706	2,662	2,618	2,572	2,524	2,476	2,427	2,378	2,328	2,278
[4] Proportion of individuals with OUD in treatment to receive MAT	30.0%	32.1%	34.3%	36.4%	38.6%	40.7%	42.9%	45.0%	47.1%	49.3%	51.4%	53.6%	55.7%	57.9%	60.0%
[5] Total number of individuals with OUD in treatment to receive MAT	866	918	968	1,015	1,060	1,102	1,141	1,178	1,212	1,244	1,274	1,300	1,325	1,347	1,367
[6] Total number of individuals with OUD in treatment to receive MAT-buprenorphine	525	557	587	615	642	668	691	714	735	754	772	788	803	816	828
[7] Total number of individuals with OUD in treatment to receive MAT-methadone	286	303	319	335	350	364	377	389	400	411	420	429	437	444	451
[8] Total number of individuals with OUD in treatment to receive MAT-naltrexone	55	59	62	65	68	70	73	75	78	80	82	83	85	86	87
[9] Total number of individuals with OUD in outpatient treatment settings	494	523	552	579	604	628	650	671	691	709	726	741	755	768	779
[10] Total number of individuals with OUD in intensive outpatient treatment settings	217	231	243	255	266	276	286	296	304	312	320	326	333	338	343
[11] Total number of individuals with OUD in rehab/residential treatment settings	104	110	116	122	127	132	137	141	145	149	153	156	159	162	164
[12] Total number individuals with OUD in inpatient treatment settings	51	54	57	60	63	65	67	69	72	73	75	77	78	79	81
2. OUD treatment in detention facilities/jails/prisons															
Population estimates for this category are included in "1. ASAM levels of care for OUD treatment"															
3. OUD treatment for pregnant women and new mothers															
Population estimates for this category are included in "1. ASAM levels of care for OUD treatment"															
4. OUD treatment for homeless and housing insecure individuals															
Population estimates for this category are included in "1. ASAM levels of care for OUD treatment"															
5. OUD treatment for adolescents															
Population estimates for this category are included in "1. ASAM levels of care for OUD treatment"															
6. Assertive Community Treatment (ACT)															
[13] Proportion of individuals to receive ACT	10.0%	9.6%	9.3%	8.9%	8.6%	8.2%	7.9%	7.5%	7.1%	6.8%	6.4%	6.1%	5.7%	5.4%	5.0%
[14] Total number of individuals eligible to receive ACT each year	87	89	90	91	91	90	90	88	87	84	82	79	76	72	68
[15] Total number of individuals to receive ACT	87	175	178	180	181	181	180	178	175	171	166	161	155	148	140
[16] Total number of ACT teams needed	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.5	1.5	1.4
[17] Total number of ACT team leaders needed	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.5	1.5	1.4
[18] Total number of psychiatrists needed	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.5	1.5	1.4
[19] Total number of psychiatrist nurses needed	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.5	1.5	1.4
[20] Total number of addiction counselors needed	1.7	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.8
[21] Total number of peer recovery coaches or peer navigators needed	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.5	1.5	1.4
[22] Total number of program assistants needed	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.5	1.5	1.4
[23] Total number of social workers needed	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.5	1.5	1.4
[24] Intervention Population Trend Ratio	0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50
ASAM American Society of Addiction Medicine; OUD Opioid Use Disorder; MAT Medications for Addiction Treatment; * Proportion of individuals with OUD in treatment at any given month during the year; ACT Assertive Community Treatment															

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Notes	Input	Source(s)
[1] Number of individuals with OUD in Trumbull County * [24]	7,560	2019 data. Past 12-month OUD. Estimate provided by Dr. Katherine Keyes.
[2] Yearly estimate from 40.0% in year 1 to 60.0% in year 15	Yearly Estimate	Based on 2018 Treatment Episode Data Set (TEDS) and 2018 National Survey on Drug Use and Health (NSDUH), approximately 20-30% of individuals with OUD were in treatment at some point in the past 12 months nationally. The World Health Organization (WHO) recommends a 40% minimum target OUD treatment coverage as a benchmark for high treatment coverage. (1) Williams AR, Nunes EV, Bisaga A, Levin FR, Olsson M. Development of a Cascade of Care for Responding to the Opioid Epidemic. The American Journal of Drug and Alcohol Abuse. 2019;45:1-0. (2) Substance Abuse and Mental Health Services Administration, 2018 National Survey on Drug Use and Health. Rockville, MD: Center for Behavioral Health Statistics and Quality. (3) WHO, UNODC, UNAIDS Technical Guide for Countries to Set Targets for Universal Access to HIV Prevention, Treatment and Care for Injecting Drug Users, 2012 Revision. https://apps.who.int/iris/bitstream/handle/10665/77969/9789241504379_eng.pdf?sequence=1 .
[3] = [1] * [2]		
[4] Yearly estimate from 30.0% in year 1 to 60.0% in year 15	Yearly Estimate	Based on 2017 Ohio-specific TEDS data. 24.5% of individuals who received treatment for OUD received MAT. Substance Abuse and Mental Health Services Administration. 2017 Treatment Episode Data Set (TEDS). Rockville, MD: Center for Behavioral Health Statistics and Quality.
[5] = [3] * [4]		
[6] = [5] * 60.6%	60.6%	2018 data. Buprenorphine utilization among individuals with OUD in treatment receiving MAT nationally in 2018. Substance Abuse and Mental Health Services Administration, 2018 National Survey on Drug Use and Health. Rockville, MD: Center for Behavioral Health Statistics and Quality.
[7] = [5] * 33.0%	33.0%	2018 data. Methadone utilization among individuals with OUD in treatment receiving MAT nationally in 2018. Substance Abuse and Mental Health Services Administration, 2018 National Survey on Drug Use and Health. Rockville, MD: Center for Behavioral Health Statistics and Quality.
[8] = [5] * 6.4%	6.4%	2018 data. Naltrexone utilization among individuals with OUD in treatment receiving MAT nationally in 2018. Substance Abuse and Mental Health Services Administration, 2018 National Survey on Drug Use and Health. Rockville, MD: Center for Behavioral Health Statistics and Quality.
[9] = [3] * 57.0%	57.0%	Proportion of individuals with OUD receiving care in outpatient treatment settings. Informed by average 2014-2018 Ohio-specific TEDS data. (1) Substance Abuse and Mental Health Services Administration. 2014-2018 Treatment Episode Data Set (TEDS). Rockville, MD: Center for Behavioral Health Statistics and Quality. (2) Expert opinion.
[10] = [3] * 25.1%	25.1%	Proportion of individuals with OUD receiving care in intensive outpatient treatment settings. Informed by average 2014-2018 Ohio-specific TEDS data. (1) Substance Abuse and Mental Health Services Administration. 2014-2018 Treatment Episode Data Set (TEDS). Rockville, MD: Center for Behavioral Health Statistics and Quality. (2) Expert opinion.
[11] = [3] * 12.0%	12.0%	Proportion of individuals with OUD receiving care in rehab/residential treatment settings. Informed by average 2014-2018 Ohio-specific TEDS data. (1) Substance Abuse and Mental Health Services Administration. 2014-2018 Treatment Episode Data Set (TEDS). Rockville, MD: Center for Behavioral Health Statistics and Quality. (2) Expert opinion.
[12] = [3] * 5.9%	5.9%	Proportion of individuals with OUD receiving care in inpatient treatment settings. Informed by average 2014-2018 Ohio-specific TEDS data. (1) Substance Abuse and Mental Health Services Administration. 2014-2018 Treatment Episode Data Set (TEDS). Rockville, MD: Center for Behavioral Health Statistics and Quality. (2) Expert opinion.
[13] Yearly estimate from 10.0% in year 1 to 5.0% in year 15	Yearly Estimate	A subset of individuals with OUD who receive MAT are also eligible to receive Assertive Community Treatment (ACT). Informed by: (1) Assertive Community Treatment (ACT) Evidence-Based Practices (EBP) Kit. Substance Abuse and Mental Health Services Administration. U.S. Department of Health & Human Services. https://store.samhsa.gov/product/Assertive-Community-Treatment-ACT-Evidence-Based-Practices-EBP-Kit/5MA08-4344 . (2) Expert opinion.
[14] = [5] * [13]		

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 Monument Analytics A Health Care Consultancy															
2E. Distributing Naloxone and Providing Training															
	Year														
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<u>1. First responders training</u>															
[1] Total number of first responders in Trumbull County eligible to receive training	1,592	1,593	1,594	1,595	1,597	1,598	1,599	1,600	1,602	1,603	1,604	1,605	1,606	1,608	1,609
[2] Total number of first responders in Trumbull County to receive training	1,592	399	400	400	400	401	401	401	402	402	402	403	403	403	403
[3] Total number of hours for first responder training	4,776	1,198	1,199	1,200	1,201	1,202	1,203	1,204	1,205	1,206	1,207	1,208	1,208	1,209	1,210
<u>2. Naloxone for first responders</u>															
[4] Total number of Narcan® doses for first responders	4,776	4,779	4,783	4,786	4,790	4,794	4,797	4,801	4,805	4,808	4,812	4,816	4,819	4,823	4,827
<u>3. Naloxone for EDs</u>															
[5] Number of opioid-related ED visits and hospitalizations in Trumbull County	446	426	407	389	371	355	339	323	309	295	282	269	257	246	234
[6] Total number of generic injectable naloxone doses for EDs	892	852	814	777	742	709	677	647	618	590	564	538	514	491	469
<u>4. Naloxone for high-risk patients</u>															
[7] Total number of OUD patients eligible for Narcan® distribution	7,221	6,897	6,587	6,291	6,009	5,739	5,481	5,235	5,000	4,776	4,562	4,357	4,161	3,974	3,796
[8] Proportion of OUD patients to receive Narcan®	20.0%	22.1%	24.3%	26.4%	28.6%	30.7%	32.9%	35.0%	37.1%	39.3%	41.4%	43.6%	45.7%	47.9%	50.0%
[9] Total number of OUD patients to receive Narcan®	1,444	1,527	1,600	1,663	1,717	1,763	1,801	1,832	1,857	1,876	1,890	1,898	1,902	1,902	1,898
[10] Total number of kits for OUD patients	1,444	1,527	1,600	1,663	1,717	1,763	1,801	1,832	1,857	1,876	1,890	1,898	1,902	1,902	1,898
[11] Total number of Narcan® doses for OUD patients	2,888	3,054	3,199	3,325	3,434	3,525	3,602	3,665	3,715	3,753	3,780	3,797	3,805	3,804	3,796
<u>5. Naloxone public lock boxes</u>															
[12] Total Trumbull County population to establish naloxone public lock boxes	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273	195,273
[13] Total number of naloxone public lock boxes	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[14] Total number of Narcan® doses needed for public lock boxes	391	0	0	391	0	0	391	0	0	391	0	0	391	0	0
ED Emergency Department; OUD Opioid Use Disorder															
Notes	Input	Source(s)													
[1] Number of first responders in Trumbull County		Retrieved from tab "2D. Workforce Expansion", input [6].													
[2] = [1] for year 1 and newly hired first responders for the subsequent years	Yearly Estimate	All first responders should receive training in the first year. Only newly hired first responders will receive training in subsequent years.													
First responders average turnover rate	25.0%	Informed by American Ambulance Association. AAA/Avesta 2019 Ambulance Industry Employee Turnover Study. https://ambulance.org/wp-content/uploads/2019/07/AAA-Avesta-2019-EMS-Employee-Turnover-Study-Final.pdf . Published July 2019.													
[3] = [2] * 3 hours	3	Duration of training. Informed by Professional Education Systems Institute (PESI). Trauma-Informed First Responder Training. https://www.pesi.com/store/detail/26756 .													
[4] = [1] * 3 doses	3	Number of Narcan® doses per first responder per year. Bureau of Justice Assistance. National Training and Technical Assistance Center, Law Enforcement Naloxone Toolkit. https://bjat.ta.bja.ojp.gov/tools/naloxone/Naloxone-Background .													
[5] Number of opioid-related ED visits and hospitalizations in Trumbull County	Yearly Estimate	Retrieved from tab "2A. Connecting Individuals", input [8].													

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Number of police officers	509	2019 data. Ohio Department of Public Safety. https://www.ocjs.ohio.gov/links/Ohio-CollaborativeReport2019.pdf .
First responders population	1,591	Sum of the number of firefighters, EMTs and paramedics, and police officers.
First responders annual employment growth rate	0.1%	Weighted average of firefighters, EMTs and paramedics, and police officers annual employment growth rates. 2018-2028 Ohio Job Outlook Employment Projections. 10-year employment growth rates were converted to annual employment growth rates. Ohio Department of Job and Family Services. https://ohiolmi.com/portals/206/Proj/Ohio/Ohio_Job_Outlook_2018-2028.pdf .
[7] Yearly estimate from 20.0% in year 1 to 5.0% in year 15	Yearly Estimate	Compassion fatigue interventions should target 20.0% of first responders in year 1 and 5.0% by year 15. Expert opinion.
[8] Number of prescribers in Trumbull County	Yearly Estimate	Retrieved from tab "1A. Professional Education", input [1].
[9] Yearly estimate from 5.0% in year 1 to 1.0% in year 15	Yearly Estimate	Compassion fatigue interventions should target 5.0% of prescribers in year 1 and 1.0% by year 15. Expert opinion.
[10] = ([6] * [7]) + ([8] * [9])		
[11] Total Trumbull County population aged 18 and older	155,632	2018 data. All individuals aged 18 years and older (79.7% in 2019 in Trumbull County). The Ohio Development Services Agency projects that the population of Trumbull County will decrease from 2020 (200,840 residents) through 2035 (189,810 residents). Given the change in population of the County, the population projection from 2020 to 2035 is averaged. (1) Ohio State Annual Estimates of the Resident Population by Single Year of Age and Sex: April 1, 2010 to July 1, 2019. U.S. Census Bureau, American Community Survey. https://www.census.gov/data/tables/time-series/demo/popest/2010s-state-detail.html . (2) Ohio Development Services Agency, Population Projections. https://development.ohio.gov/files/research/P6090.pdf .
[12] = [11] * 8.0%	8.0%	2016 data. 8.0% of U.S. adults (19.6 million) had high-impact chronic pain. Dahlhamer J, Lucas J, Zelaya C, Nahin R, Mackey S, DeBar L, Kerns R, Von Korff M, Porter L, Helmsick C. Prevalence of Chronic Pain and High-Impact Chronic Pain Among Adults —United States, 2016. Morbidity and Mortality Weekly Report. 2018;67:1001.
[13] = [12] / 2,083	2,083	Target panel size per pain specialist is based on 3 visits per year, 25 patients per day and 250 days per year. Informed by (1) Murray M, Davies M, Boushon B. Panel Size: How Many Patients Can One Doctor Manage? Fam Pract Manag. 2007;14:44-51. https://www.aafp.org/fpm/2007/0400/fpm20070400p44.pdf . (2) Expert opinion.
[14] Retrieved from "Abatement Scaling" tab		
Costs Description		
[3] MAT recruitment consultant (typically a nurse practitioner) full-time equivalent (FTE) annual compensation		
[5] Medical social worker FTE annual compensation		
[10] Compassion fatigue interventions cost per professional		
[13] Pain treatment specialist FTE annual compensation		
Suggested Costs	Value	Source(s)
Compassion fatigue interventions cost per professional		
Source #1	\$523.00	Cost in 2019 dollars. \$1 million / 637 first responders / 3 years. City of Huntington Compass Programs. https://compasshuntington.com/what-is-compass/ .
Source #2	\$575.00	Cost in 2020 dollars. Center for Mindful Self-Compassion. https://centerformsc.org/lomsc/ .
Source #3	\$495.00	Cost in 2020 dollars. Duke Integrative Medicine. Mindfulness Based Stress Reduction. https://dukeintegrativemedicine.org/programs-training/public/mindfulness-based-stress-reduction/ .


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[15] = [14] in year one and sum of current year and previous year in subsequent years	Yearly Estimate	Though ACT services are time-unlimited, we continue services for 2 years. Informed by: Huz S, Thorning H, White CN, Fang L, Smith BT, Radigan M, Dixon LB. Time In Assertive Community Treatment: A Statewide Quality Improvement Initiative to Reduce Length of Participation. Psychiatric Services. 2017;38:539-541.
[16] = [15] / 100		Number of ACT teams needed.
Number of clients per ACT team	100	An interdisciplinary team of 8 to 12 professionals serve 100 clients. Assertive Community Treatment (ACT) Evidence-Based Practices (EBP) Kit. Substance Abuse and Mental Health Services Administration. U.S. Department of Health & Human Services. https://store.samhsa.gov/product/Assertive-Community-Treatment-ACT-Evidence-Based-Practices-EBP-KIT/SMA08-4344 .
[17] Total number of ACT team leaders needed = 1 * [16]	1	One full-time equivalent (FTE) mental health professional to act as ACT team lead. Assertive Community Treatment (ACT) Evidence-Based Practices (EBP) Kit. Substance Abuse and Mental Health Services Administration. U.S. Department of Health & Human Services. https://store.samhsa.gov/product/Assertive-Community-Treatment-ACT-Evidence-Based-Practices-EBP-KIT/SMA08-4344 .
[18] Total number of psychiatrists needed = 1 * [16]	1	One FTE psychiatrist is needed per ACT team. Assertive Community Treatment (ACT) Evidence-Based Practices (EBP) Kit. Substance Abuse and Mental Health Services Administration. U.S. Department of Health & Human Services. https://store.samhsa.gov/product/Assertive-Community-Treatment-ACT-Evidence-Based-Practices-EBP-KIT/SMA08-4344 .
[19] Total number of psychiatric nurses needed = 1 * [16]	1	One FTE psychiatric nurse is needed per ACT team. Assertive Community Treatment (ACT) Evidence-Based Practices (EBP) Kit. Substance Abuse and Mental Health Services Administration. U.S. Department of Health & Human Services. https://store.samhsa.gov/product/Assertive-Community-Treatment-ACT-Evidence-Based-Practices-EBP-KIT/SMA08-4344 .
[20] Total number of addiction counselors needed = 2 * [16]	2	Two FTE addiction counselors are needed per ACT team. Assertive Community Treatment (ACT) Evidence-Based Practices (EBP) Kit. Substance Abuse and Mental Health Services Administration. U.S. Department of Health & Human Services. https://store.samhsa.gov/product/Assertive-Community-Treatment-ACT-Evidence-Based-Practices-EBP-KIT/SMA08-4344 .
[21] Total number of peer recovery coaches or peer navigators needed = 1 * [16]	1	One FTE peer recovery coach or peer navigator is needed per ACT team. Assertive Community Treatment (ACT) Evidence-Based Practices (EBP) Kit. Substance Abuse and Mental Health Services Administration. U.S. Department of Health & Human Services. https://store.samhsa.gov/product/Assertive-Community-Treatment-ACT-Evidence-Based-Practices-EBP-KIT/SMA08-4344 .
[22] Total number of program assistants needed = 1 * [16]	1	One FTE program assistant is needed per ACT team. Assertive Community Treatment (ACT) Evidence-Based Practices (EBP) Kit. Substance Abuse and Mental Health Services Administration. U.S. Department of Health & Human Services. https://store.samhsa.gov/product/Assertive-Community-Treatment-ACT-Evidence-Based-Practices-EBP-KIT/SMA08-4344 .
[23] Total number of social workers needed = 1 * [16]	1	One FTE social worker is needed per ACT team. Assertive Community Treatment (ACT) Evidence-Based Practices (EBP) Kit. Substance Abuse and Mental Health Services Administration. U.S. Department of Health & Human Services. https://store.samhsa.gov/product/Assertive-Community-Treatment-ACT-Evidence-Based-Practices-EBP-KIT/SMA08-4344 .
[24] Retrieved from "Abatement Scaling" tab		
Costs Description		
[6] Buprenorphine cost per person per month * 12 months		
[7] Methadone cost per person per month * 12 months		
[8] Naltrexone cost per person per month * 12 months		
[9] Outpatient treatment average cost per month * 12 months		
[10] Intensive outpatient treatment average cost per month * 12 months		
[11] Residential treatment average cost per month * 12 months		
[12] Inpatient treatment average cost per month * 12 months		
[17] Licensed clinical social worker full-time equivalent (FTE) annual compensation		
[18] Psychiatrist FTE annual compensation		
[19] Psychiatrist nurse FTE annual compensation		
[20] Addiction counselor FTE annual compensation		
[21] Peer recovery coach or peer navigator FTE annual compensation		
[22] Program assistant FTE annual compensation		
[23] Social worker FTE annual compensation		

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Suggested Costs	Value	Source(s)
ASAM levels of care treatment costs		
Outpatient treatment average cost per month	\$3,048	Cost in 2017 dollars. Code H0006 with a comprehensive program of nine hours of treatment per week and excludes medication cost. (1) American Society of Addiction Medicine. https://www.asam.org/docs/default-source/education-docs/ohio-medicaid-slides.pdf?sfvrsn=f5d97ec2_2 . (2) Ohio Department of Medicaid. https://medicaid.ohio.gov/Provider/FeeScheduleandRates/SchedulesandRates#1682653-outpatient-hospital-behavioral-health-services .
Intensive outpatient treatment average cost per month	\$4,064	Cost in 2017 dollars. Code H0006 with a comprehensive program of twelve hours of treatment per week and excludes medication cost. (1) American Society of Addiction Medicine. https://www.asam.org/docs/default-source/education-docs/ohio-medicaid-slides.pdf?sfvrsn=f5d97ec2_2 . (2) Ohio Department of Medicaid. https://medicaid.ohio.gov/Provider/FeeScheduleandRates/SchedulesandRates#1682653-outpatient-hospital-behavioral-health-services .
Residential treatment average cost per month	\$4,577	Cost in 2017 dollars. Code H0034. Excludes medication cost. (1) Ohio Department of Medicaid. https://www.caresource.com/documents/medicaid-oh-policy-reimburse-py-0137-20190625/ . (2) Ohio Department of Medicaid. https://medicaid.ohio.gov/Provider/FeeScheduleandRates/SchedulesandRates#1682653-outpatient-hospital-behavioral-health-services .
Inpatient treatment average cost per month	\$5,714	Cost in 2017 dollars. Code H0036. Excludes medication cost. (1) Ohio Department of Medicaid. https://www.caresource.com/documents/medicaid-oh-policy-reimburse-py-0137-20190625/ . (2) Ohio Department of Medicaid. https://medicaid.ohio.gov/Provider/FeeScheduleandRates/SchedulesandRates#1682653-outpatient-hospital-behavioral-health-services . (3) Average length of inpatient stay in Ohio (18.6 days) informed by 2018 Ohio-specific TEDS-D data. Substance Abuse and Mental Health Services Administration. 2017 Treatment Episode Data Set (TEDS). Rockville, MD: Center for Behavioral Health Statistics and Quality. Remaining days in the month calculated from residential treatment cost.
OUD treatment drug costs		
Buprenorphine cost per person per month		
Unit	2 mg	
Unit cost	\$0.46	Cost in 2021 dollars. National Average Drug Acquisition Cost. Updated April 6, 2021. https://data.medicaid.gov/Drug-Pricing-and-Payment/NADAC-National-Average-Drug-Acquisition-Cost-/a4y5-998d .
Dosage	12 mg/day	
Cost per month	\$82.80	
Monthly dispensing fee	\$10.56	Cost in 2020 dollars. Average of tiered professional dispensing fee. Medicaid Covered Outpatient Prescription Drug Reimbursement Information by State. Updated December 2020. https://www.medicare.gov/medicaid/prescription-drugs/state-prescription-drug-resources/drug-reimbursement-information/index.html .
Total cost per month	\$93.36	
Methadone cost per person per month		
Unit	5 mg	
Unit cost	\$0.12	Cost in 2021 dollars. National Average Drug Acquisition Cost. Updated April 6, 2021. https://data.medicaid.gov/Drug-Pricing-and-Payment/NADAC-National-Average-Drug-Acquisition-Cost-/a4y5-998d .
Dosage	60 mg/day	
Cost per month	\$43.20	
Monthly dispensing fee	\$10.56	Cost in 2020 dollars. Average of tiered professional dispensing fee. Medicaid Covered Outpatient Prescription Drug Reimbursement Information by State. Updated December 2020. https://www.medicare.gov/medicaid/prescription-drugs/state-prescription-drug-resources/drug-reimbursement-information/index.html .
Total cost per month	\$53.76	

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2D. Workforce Expansion and Resiliency																
	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1. OUD treatment providers																
[1] Total number of prescribers in Trumbull County		468	472	475	479	482	486	490	493	497	501	504	508	512	516	520
[2] Total number of prescribers to be targeted for recruitment to provide OUD treatment		47	47	48	48	48	0	0	0	0	0	0	0	0	0	0
[3] Total number of recruitment consultants needed		0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Medical social workers																
[4] Total number of opioid-related ED visits and hospitalizations		446	426	407	389	371	355	339	323	309	295	282	269	257	246	234
[5] Total number of medical social workers needed		1.8	1.7	1.6	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.0	1.0	0.9
3. Reducing burnout/compassion fatigue																
[6] Total number of first responders eligible to receive compassion fatigue interventions		1,592	1,593	1,594	1,595	1,597	1,598	1,599	1,600	1,602	1,603	1,604	1,605	1,606	1,608	1,609
[7] Proportion of first responders to receive compassion fatigue interventions		20.0%	18.9%	17.9%	16.8%	15.7%	14.6%	13.6%	12.5%	11.4%	10.4%	9.3%	8.2%	7.1%	6.1%	5.0%
[8] Total number of prescribers eligible for compassion fatigue interventions		468	472	475	479	482	486	490	493	497	501	504	508	512	516	520
[9] Proportion of prescribers to receive compassion fatigue interventions		5.0%	4.7%	4.4%	4.1%	3.9%	3.6%	3.3%	3.0%	2.7%	2.4%	2.1%	1.9%	1.6%	1.3%	1.0%
[10] Total number of professionals to receive compassion fatigue interventions		342	324	306	288	270	251	233	215	197	178	160	141	123	104	86
4. Pain treatment specialists																
[11] Total Trumbull County population aged 18 years and older		155,632	155,632	155,632	155,632	155,632	155,632	155,632	155,632	155,632	155,632	155,632	155,632	155,632	155,632	155,632
[12] Total Trumbull County population aged 18 years and older with high-impact pain		12,451	12,451	12,451	12,451	12,451	12,451	12,451	12,451	12,451	12,451	12,451	12,451	12,451	12,451	12,451
[13] Total number of pain treatment specialists needed		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
[14] Intervention Population Trend Ratio		0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50
OUD Opioid Use Disorder; ED Emergency Department																
Notes	Input	Source(s)														
[1] Number of prescribers in Trumbull County	Yearly Estimate	Retrieved from tab "1A. Professional Education", input [1].														
[2] = [1] * 10.0%	10.0%	Proportion of prescribers in Trumbull County that will be targeted by MAT recruitment consultants starting in year 1 and through year 5 of the plan. Expert opinion.														
[3] = [2] / 500	500	Number of unique prescribers visited by a MAT recruitment consultant per year. Each prescriber will be visited twice in a given year by a MAT recruitment consultant. 250 work days per year, but approximately one-fifth of the consultant's time would be administrative. 5 prescribers per day * 200 work days / 2 visits per year = 500 prescribers per year. Expert opinion.														
[4] Number of opioid-related ED visits and hospitalizations in Trumbull County	Yearly Estimate	Retrieved from tab "2A. Connecting Individuals", input [8].														
[5] = [4] / 250	250	The average opioid-related emergency department visit requires approximately 8 hours of a medical social worker's time and a medical social worker will typically work 2,000 hours per year, resulting in an average caseload of 250 cases per medical social worker. Expert opinion.														
[6] Number of first responders adjusted by annual employment growth rate starting in 2020	858	2020 data. U.S. Fire Administration. https://apps.usfa.fema.gov/registry/download .														
Number of firefighters	858															
Number of emergency medical technicians (EMTs) and paramedics	224	2020 data. Estimate scaled to reflect the population of Trumbull County relative to Ohio overall. Ohio Department of Public Safety. Active Certification Totals. https://www.ems.ohio.gov/links/ems_cert_total.pdf .														

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[11]	Number of new endocarditis cases with opioid-related IVDU * [12]	11	Average number of new OUD-endocarditis cases per year per 100,000 population * population in Trumbull County retrieved from tab "1C. Drug Disposal", input [1].
	Average number of new OUD-endocarditis cases per year per 100,000 population	5.5	2016 data. In the East North Central Midwest U.S. census region there were 5.5 OUD-endocarditis inpatient stays per 100,000 population. Weiss AJ, Heslin KC, Stocks C, Owens PL. Hospital Inpatient Stays Related to Opioid Use Disorder and Endocarditis, 2016: Statistical Brief# 256. Agency for Healthcare Research and Quality. 2020;20.
	Endocarditis annual mortality rate	6.4%	2016 data. Accounts for endocarditis annual mortality rate (6.4%). Kadri AN, Wilner B, Hernandez AV, Nakhoul G, Chahine J, Griffin B, Pettersson G, Grimm R, Navia J, Gordon S, Kapadia SR. Geographic Trends, Patient Characteristics, and Outcomes of Infective Endocarditis Associated With Drug Abuse in the United States From 2002 to 2016. Journal of the American Heart Association. 2019;8:e012969.
[12]	Retrieved from "Abatement Scaling" tab		
Costs Description			
[3]	HCV/HIV screening cost per case		
[6]	HCV treatment cost per case		
[10]	HIV treatment cost per case per year		
[11]	Endocarditis treatment cost per case		
	Suggested Costs	Value	Source(s)
	HCV/HIV screening cost per case	\$71.00	Cost in 2015 dollars. Schackman BR, Leff JA, Barter DM, DiLorenzo MA, Feaster DJ, Metsch LR, Freedberg KA, Linas BP. Cost-Effectiveness of Rapid Hepatitis C Virus (HCV) Testing and Simultaneous Rapid HCV and HIV Testing in Substance Abuse Treatment Programs. Addiction. 2015;110:129-143.
	HCV treatment cost per case per year	\$24,000	Cost in 2018 dollars. Gilead began selling "authorized" generic versions of Eplclusa and Harvoni in January 2019 at a list price of \$24,000. Johnson, Steven R. Gilead's Generic Hep C Drugs May Increase Access Through Medicaid. Modern Healthcare. September 29, 2018.
	HIV treatment cost per case	\$31,147	Cost in 2011 dollars. Ritchwood TD, Bishu KG, Egede LE. Trends in Healthcare Expenditure among People Living with HIV/AIDS in the United States: Evidence from 10 Years of Nationally Representative Data. International Journal for Equity in Health. 2017;16:188.
	Endocarditis treatment cost per case		
	Source #1	\$50,000	Cost in 2015 dollars. Cost for drug-dependence endocarditis hospitalization. Fleischauer AT, Ruhl I, Rhea S, Barnes E. Hospitalizations for Endocarditis and Associated Health Care Costs Among Persons With Diagnosed Drug Dependence—North Carolina, 2010–2015. Morbidity and Mortality Weekly Report. 2017;66:569.
	Source #2	\$37,460	Cost in 2015 dollars. \$17,306,464 total charges / 462 cases. Bates MC, Annie F, Jha A, Kerns F. Increasing Incidence of IV-Drug Use Associated Endocarditis in Southern West Virginia and Potential Economic Impact. Clinical Cardiology. 2019;42:432-7.
	Source #3	\$95,799	Cost in 2015 dollars. Medicare or Medicaid coverage. Keeshin SW, Feinberg J. Endocarditis as a Marker for New Epidemics of Injection Drug Use. the American Journal of the Medical Sciences. 2016;352:609-14.

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Methadone cost per person per month			
Unit	10 mg		
Unit cost	\$0.10		Cost in 2021 dollars. National Average Drug Acquisition Cost. Updated April 6, 2021. https://data.medicaid.gov/Drug-Pricing-and-Payment/NADAC-National-Average-Drug-Acquisition-Cost-/a4y5-998d .
Dosage	60 mg/day		
Cost per month	\$18.00		
Monthly dispensing fee	\$10.56		Cost in 2020 dollars. Average of tiered professional dispensing fee. Medicaid Covered Outpatient Prescription Drug Reimbursement Information by State. Updated December 2020. https://www.medicaid.gov/medicaid/prescription-drugs/state-prescription-drug-resources/drug-reimbursement-information/index.html .
Total cost per month	\$28.56		
Naltrexone cost per person per month			
Unit	380 mg		Monthly intramuscular injection.
Unit cost	\$1,340		Cost in 2021 dollars. National Average Drug Acquisition Cost. Updated April 6, 2021. https://data.medicaid.gov/Drug-Pricing-and-Payment/NADAC-National-Average-Drug-Acquisition-Cost-/a4y5-998d .
Dosage	1		
Monthly drug administration cost (CPT Code 96372)	\$13.64		Cost in 2021 dollars. Therapeutic, prophylactic, or diagnostic injection; subcutaneous or intramuscular. Center for Medicare and Medicaid Serices. Physician Fee Schedule Search. Updated January 20, 2021. https://www.cms.gov/medicare/physician-fee-schedule/search?Y=0&T=0&HT=0&CT=2&H1=96372&C=113&M=1 .
Total cost per month	\$1,354		

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2C. Managing Complications Attributable to the Epidemic

	Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1. HCV and HIV screening																
[1] Total number of opioid injection drug users		1,375	1,314	1,255	1,198	1,144	1,093	1,044	997	952	910	869	830	793	757	723
[2] Proportion of opioid injection drug users to be screened		60.0%	61.4%	62.9%	64.3%	65.7%	67.1%	68.6%	70.0%	71.4%	72.9%	74.3%	75.7%	77.1%	78.6%	80.0%
[3] Total number of opioid injection drug users to be screened		825	807	789	770	752	734	716	698	680	663	645	628	611	595	578
2. HIV treatment																
[4] Total number of prevalent HCV cases with opioid-related IVDU, 2012-2020		276	276	276	276	276	0	0	0	0	0	0	0	0	0	0
[5] Total number of new HCV cases with opioid-related IVDU		147	140	134	128	122	117	111	106	102	97	93	88	85	81	77
[6] Total HCV cases to be treated		418	412	405	399	394	115	110	105	100	96	92	87	84	80	76
3. HIV treatment																
[7] Total number of prevalent HIV cases with opioid-related IVDU, 2012-2020		20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[8] Total number of new HIV cases with opioid-related IVDU		2	2	2	2	2	2	2	2	1	1	1	1	1	1	1
[9] Total HIV cases to be treated		22	2	2	2	2	2	2	2	1	1	1	1	1	1	1
[10] Total cumulative HIV cases to be treated (from year 1 to year 15)		21	23	24	26	27	28	29	30	31	32	32	33	33	34	34
4. Endocarditis treatment																
[11] Total number of new endocarditis cases with opioid-related IVDU		10	9	9	8	8	8	7	7	7	6	6	6	6	5	5
[12] Intervention Population Trend Ratio		0.96	0.91	0.87	0.83	0.79	0.76	0.73	0.69	0.66	0.63	0.60	0.58	0.55	0.53	0.50

HCV Hepatitis C Virus; HIV Human Immunodeficiency Virus; IVDU Intravenous Drug Use

Notes	Input	Source(s)
[1] Heroin use population in Trumbull County	Yearly Estimate	Retrieved from tab "1E. Harm Reduction", input [1].
[2] Yearly estimate from 60.0% in year 1 to 80.0% in year 15	Yearly Estimate	2019 data. Proportion of heroin use population that should be screened each year: 60.0% in year 1 (informed by the 54% of people who inject drugs and reported in 2015 that they used a syringe service program in the past year, nationally) and 80.0% by year 15. Screening will not be limited to syringe service programs. Testing frequency is based on HIV guidelines given lack of conclusive data regarding testing frequency for HCV. Centers for Disease Control and Prevention, Frequency of HIV Testing and Time from Infection to Diagnosis Improve. https://www.cdc.gov/media/releases/2017/p1128-frequency-hiv-testing.html .
[3] = [1] * [2]		
[4] Number of prevalent HCV cases with opioid-related IVDU that can be treated each year	20.0%	By year 5, all existing HCV cases with opioid-related IVDU from 2012-2020 are assumed to have received treatment. Expert opinion.
Proportion of HCV cases with opioid-related IVDU that can be treated each year		20.0% of existing HCV cases can be reached each year. Expert opinion.
Proportion of new HCV cases due to IVDU	62.0%	Informed by: (1) Michigan Department of Health & Human Services. 2018 Hepatitis B and C Annual Surveillance Report. https://www.michigan.gov/documents/mdhhs/2018_REPORT_65667_7.pdf . (2) Williams IT, Bell BP, Kuhnert W, Alter MJ. Incidence and Transmission Patterns of Acute Hepatitis C in the United States, 1982-2006. Archives of Internal Medicine. 2011;171:242-8.

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Proportion of opioid-related IVDU	70.0%	Informed by: fentanyl, opiates, or heroin as the primary drug of choice reported by Project DAWN/Summit County syringe service program. https://app.powerbi.com/view?r=eyJpbnNlbnRlYyBIMzAtMTN2Q4Y5ODM2NjIwFmNmEhNDYyZmN1MTg4IiwidC6ImJlMmWlOjU2LTQ4N2ENCjYyMyQ4YTIQLWEzYVYwMmNmMTFmZSImMlQJfj9 .
Average number of new HCV cases per year	354	2014-2018 data. Average number of past or present chronic cases from 2014 to 2018. Ohio Department of Health, Hepatitis C 5-Year Report. Acute cases excluded. https://odh.ohio.gov/wps/wcm/connect/gov/a85bd075-e2e9-4d3-bd72-480ea66279b2/HCV+5+Year+Report_2018.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_M1HGGIK0N0J00Q9DDDDM3000-a85bd075-e2e9-4d3-bd72-480ea66279b2-mLRwTqK .
Average number of new HCV cases per year with opioid-related IVDU	154	Proportion of new HCV cases due to IVDU * Proportion of opioid-related IVDU * Average number of new HCV cases per year.
Number of prevalent HCV cases with opioid-related IVDU 2012-2020	1,382	Average number of new HCV cases per year * 9 years (2012-2020).
[5] Average number of new HCV cases per year with opioid-related IVDU * [12]		Proportion of new HCV cases due to IVDU * Proportion of opioid-related IVDU * Average number of new HCV cases per year.
[6] = ([4] + [5]) / (1 + 1.2%)	1.2%	Accounts for HCV annual mortality rate. 2016 data [1.2%]. National estimate. Rosenberg ES, Rosenthal EM, Hall EW, Barker L, Hofmeister MG, Sullivan PS, Dietz P, Mermin I, Ryerson AB. Prevalence of Hepatitis C Virus Infection in US States and the District of Columbia, 2013 to 2016. JAMA Network Open. 2018;1:e186371.
[7] Number of prevalent HIV cases with opioid-related IVDU that can be treated		All existing HIV cases with opioid-related IVDU from 2012-2020 are assumed to be on treatment. Expert opinion.
Proportion of new HIV cases due to IVDU	13.0%	2019 data. Informed by new cases of HIV in Ohio attributed to injection drug use from 2015 to 2019. IVDU (7%) and Male-to-male sexual contact/IVDU transmission (6%) Ohio. Ohio Department of Health, HIV Surveillance Data Tables. New Diagnoses of HIV Infection Reported in Ohio. https://odh.ohio.gov/wps/wcm/connect/gov/6ceaf279-ee66-4254-b899-386b585fde5a/Ohio2019.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_M1HGGIK0N0J00Q9DDDDM3000-6ceaf279-ee66-4254-b899-386b585fde5a-nfodWmU .
Proportion of opioid-related IVDU	70.0%	Informed by: fentanyl, opiates, or heroin as the primary drug of choice reported by Project DAWN/Summit County syringe service program. https://app.powerbi.com/view?r=eyJpbnNlbnRlYyBIMzAtMTN2Q4Y5ODM2NjIwFmNmEhNDYyZmN1MTg4IiwidC6ImJlMmWlOjU2LTQ4N2ENCjYyMyQ4YTIQLWEzYVYwMmNmMTFmZSImMlQJfj9 .
Average number of new HIV cases per year	24	2015-2019 data. Average number of new HIV cases in Ohio multiplied by 2.5%, the average overdose deaths in Trumbull County (96 deaths) from 2016-2019 relative to the state of Ohio (3,730 deaths; CDC WONDER data) (1) Ohio Department of Health, HIV Surveillance Data Tables. New Diagnoses of HIV Infection Reported in Ohio. https://odh.ohio.gov/wps/wcm/connect/gov/6ceaf279-ee66-4254-b899-386b585fde5a/Ohio2019.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_M1HGGIK0N0J00Q9DDDDM3000-6ceaf279-ee66-4254-b899-386b585fde5a-nfodWmU . (2) Centers for Disease Control and Prevention. CDC WONDER Online Database. http://wonder.cdc.gov/mcd-icd10.html .
Average number of new HIV cases per year with opioid-related IVDU	2	Proportion of new HIV cases due to IVDU * Proportion of opioid-related IVDU * Average number of new HIV cases per year.
Number of prevalent HIV cases with opioid-related IVDU 2012-2020	20	Average number of new HIV cases per year * 9 years (2012-2020).
[8] Average number of new HIV cases per year with opioid-related IVDU * [12]		Proportion of new HIV cases due to IVDU * Proportion of opioid-related IVDU * Average number of new HIV cases per year.
[9] = [7] + [8]		
[10] = [9] for year 1 and = [9] + [10] from the previous year for the remaining years / (1 + 2.0%)	2.0%	2018 data. Accounts for HIV annual mortality rate (2.0%). 646 deaths among individuals with HIV in Ohio / 32,940 living with HIV in Ohio = 2.0%. Centers for Disease Control and Prevention. Atlas Plus. https://gis.cdc.gov/grasp/chcht/patlas/tables.html .

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